	Records Center
SITE: 1	ndysti Plex
BREAK:	3.3
OTHER:	75267

Fall Baseflow



356 FARRAGUT CROSSING DR. KNOXVILLE, TN 37922

(423) 966-8880 FAX (423) 966-8885 cerikson@trilliuminc.com

May 18, 2001

Mr. Larry McTiernan Roux Associates, Inc. 25 Corporate Drive Suite 230 Burlington, MA 01803

Subject:

STL Connecticut Report No. 7000-2264A

Downgradient Transport (Surface Water and Sediments) Investigation

Industri-Plex Site

Woburn, Massachusetts

Total TAL Metals: 2/Surface Waters/SW-04, SW-09

1/Field Blank

Selected Total Metals:

2/Surface Waters/SW-01, SW-10

(Field Duplicates: SW-01/SW-10)

Dissolved Arsenic:

4/Surface Waters/SW-01, SW-10, SW-04, SW-09

(Field Duplicates: SW-01/SW-10)

1/Field Blank

Total Suspended Solids:

4/Surface Waters/SW-01, SW-10, SW-04, SW-09

(Field Duplicates: SW-01/SW-10)

1/Field Blank

Dear Mr. McTiernan:

A Tier II validation was performed on the inorganic analytical data for two surface water samples collected by Roux Associates, Inc. at the Industri-Plex Site in Woburn, Massachusetts. Several additional samples were also reported in this data package, but, per project specifications, only the results for SW-04 and SW-09 were validated. The samples were analyzed according to EPA Methods 6010B/7470A, as applicable, for metals and EPA Method 160.2 for TSS. For SW-04 and SW-09, the full TAL (target analyte list, per the Contract Laboratory Program) was reported for the total metals fraction and arsenic only was reported for the dissolved fraction.

The data were evaluated as Tier II level in accordance with the "Region I Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses" dated June 13, 1988, and the project-specific Quality Assurance Project Plan (QAPP). The evaluation was based on the following parameters:

HOME OFFICE:



Mr. Larry McTiernan 18 May 2001 Page 2

- Overall Evaluation of Data and Potential Usability Issues.
- Data Completeness.
- Preservation and Technical Holding Times.
 - Instrument Calibration.
- Contract Required Detection Limit (CRDL) Standards.
 - Blanks.
- Inductively Coupled Plasma (ICP) Interference Check Samples.
 - Matrix Spike (MS).
- Laboratory Duplicates.
- * Field Duplicates.
- * Laboratory Control Sample.
- * ICP Serial Dilution Analysis.
- Detection Limit Results.
- NA PE Samples/Accuracy Check.
 - Sample Quantitation
- * = All criteria were met for this parameter.
- NA = Not Applicable.

Note: Worksheets for QC parameters that met criteria or are not applicable to the method will not be included as attachments to this document.

Table I summarizes the validation recommendations which were based on the following information. Table II summarizes the overall evaluation of the data with reference to the data quality objectives (DQOs) and potential usability issues.

Overall Evaluation of Data and Potential Usability Issues

Metals

The DQO for this site is to collect data of sufficient quality to allow a technically sound evaluation of sediment fate and transport, as well as impacts to surface water, in the Hall's Brook Holding Area (HBHA), located just downstream of the Industri-Plex site. The primary intended use for the data is to determine if the HBHA sediments are being entrained and/or transported out of the HBHA during storm events. The primary analytical objective is that measurements be representative of the actual site conditions and that data resulting from field sampling and analysis activities be comparable.

Sample results for metals were qualified as the result of measurement error, which includes both analytical (laboratory) error and sampling (field) error. Measurement error associated with analysis



Mr. Larry McTiernan 18 May 2001 Page 3 STL Connecticut Report #7000-2264A

includes unacceptable matrix spike recoveries for lead and selenium, negative calibration blank responses, and laboratory blank contamination. There was one major impact on data usability.

 Results for aluminum in both samples were qualified as less than the reported values based on laboratory blank contamination.

Measurement error associated with sample collection includes field blank contamination. There was one major impact on data usability:

 The result for copper in SW-09 was qualified as less than the reported value based on field blank contamination.

Total Suspended Solids (TSS)

All quality control criteria were met for the TSS analyses of these samples.

Data Completeness

No raw data were included in the data package. This is inconsistent with Region I guidelines, which specify that full Tier III deliverables are to be provided for all data packages no matter what level of validation is to be performed. However, the lack of raw data is acceptable to the client and does not adversely affect the Tier II validation effort. Therefore, no further action was taken on this basis.

No documentation of sample pHs was provided in the data package. At the request of the validator, the laboratory provided a copy of their Preservative Record, dated 10/6/00, via facsimile on 5/17/01. This document confirmed that all samples were properly preserved, and was inserted into the data package by the validator to ensure that accurate and complete documentation is available for future reference.

Calibration

An unacceptably high recovery for nickel was reported in CCV3 (202.6%; QC 90-110%). This CCV was not directly associated with the reported analyses of SW-04 or SW-09, therefore no qualifiers were applied on this basis.

<u>Blanks</u>

The following analytes were detected in associated blanks:



Mr. Larry McTiernan 18 May 2001 Page 4

Analyte	Type of Blank	Maximum Concentration	Action Level	Action
Aluminum	Calibration	20.7 μg/L	103.5 μg/L	U
Barium	Field	0.90 μg/L	4.5 μg/L	None
Calcium	Field	265 μg/L	1325 μg/L	None
Copper	Field	3.7 μg/L	18.5 μg/L	U
Iron	Field	32.6 μg/L	163 μg/L	None
Magnesium	Field	42.1 μg/L	210.5 μg/L	None
Manganese	Field	3.7 μg/L	18.5 μg/L	None
Potassium	Calibration	487 μg/L	2435 μg/L	None
Sodium	Field	258 μg/L	1290 μg/L,	None
Zinc	Preparation	13.4 μg/L	67.0 μg/L	None

Barium, calcium, iron, magnesium, manganese, potassium, sodium, and zinc were present in both samples at concentrations exceeding the action limit for each analyte; therefore, no qualifiers were warranted for these elements based on blank contamination. The result for copper in SW-04 was also present at a concentration exceeding the action limit and was therefore not qualified based on blank contamination.

Results for aluminum in SW-04 and SW-09 were qualified as less than the reported values (U) based on blank contamination.

The result for copper in SW-09 was qualified as less than the reported value (U) based on blank contamination.

In a calibration blank, thallium gave a response that was greater than two times the negative instrument detection limit (IDL). Since this negative response may indicate the possibility of false negatives, results for thallium in SW-04 and SW-09 were qualified as estimated (UJ).

Matrix Spike

The following analytes did not meet recovery criteria for surface water sample SW-09:



Mr. Larry McTiernan STL Connecticut Report #7000-2264A

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Analyte	%REC	Limits	Action
Lead	60.8	75-125%	J, UJ
Selenium	65.1	75-125%	UJ

Results for lead and selenium in SW-04 and SW-09 were qualified as indicated above.

Sample Quantitation

Results for chromium in both samples and for cobalt and nickel in SW-04 were qualified as estimated (J) because they are less than twice the applicable instrument detection limit. All "B" flags applied by the laboratory to sample results below the applicable CRDL were removed.

Please contact the undersigned at (865) 966-8880 if you have any questions or need further information.

Very truly yours,

TRILLIUM, INC.

Carol A. Erikson

Quality Assessment Manager

Carol a Exiksor

CAE/ekd

Attachments: Table I: Recommendation Summary

Table II: Overall Evaluation of Data

Data Summary Key Data Summary Tables

Data Validation (DV) Worksheets

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TABLE I

INDUSTRI-PLEX SITE

STL Connecticut Report #7000-2264A

Recommendation Summary

Sample Nos.	Matrix	Total TAL Metals	Dissolved Arsenic	TSS
SW-04	AQ	A ¹ , J ^{1,2,3,4}	A	Α
SW-09	AQ	$A^{1,2}, J^{1,2,3}$	A	Α

AQ - aqueous

NA - not applicable

- A = Accept the results for the sample.
- A¹ = Accept the results for the sample, but qualify the positive results for aluminum as not detected (U) due to blank contamination.
- A² = Accept the results for the sample, but qualify the positive result for copper as not detected (U) due to blank contamination.
- J^{1} = Estimate (UJ) the result for thallium due to a negative calibration blank response.
- J^2 = Estimate (J, UJ) the results for lead and selenium due to unacceptable matrix spike recoveries.
- J³ = Estimate (J) the result for chromium because it is less than twice the applicable instrument detection limit.
- J⁴ = Estimate (J) the results for cobalt and nickel because they are less than twice the applicable instrument detection limits.

TABLE II

INDUSTRI-PLEX SITE STL REPORT #7000-2264A Overall Evaluation of Data

	Total TAL Metals,	Selected TAL Metals, Di	ssolved Arsenic, and	i Total Suspende	d Solids
DQOs (list all DQOs)	Sampling and/or Analytical Method Appropriate Yes or No	Measurement Error		Sampling Variability**	Potential Usability Issues
		Analytical Error	Sampling Error*		
The DQO for this site is to collect data of sufficient quality to: 1. Allow a technically sound evaluation of sediment fate and transport, as well as impacts to surface water, in the Hall's Brook Holding Area (HBHA), located just downstream of the Industri-Plex site. 2. Determine if the HBHA sediments are being entrained and/or transported out of the HBHA during storm events. 3. Be representative of the actual site conditions and comparable to other data generated in support of this project.	Analytical Method: Yes SW-846 Methods 6010B (metals), 7471A (mercury) and 160.2 (TSS) Sampling Method: Yes Grab	Refer to qualifications in Table I A ¹ J ^{1,2,3,4}	Refer to qualifications in Table I A ²		 Results for aluminum in both samples were qualified as less than the reported values due to blank contamination. The result for copper in SW-09 was qualified as less than the reported value due to blank contamination. Results for lead and selenium in both samples were estimated due to unacceptable matrix spike recoveries. Results for chromium in both samples and for cobalt and nickel in SW-04 were estimated because they were less than 2xIDL. Results for thallium in both samples were estimated due to negative calibration blank responses.

- * The evaluation of "sampling error" cannot be completely assessed in data validation.
- ** Sampling variability is not assessed in data validation.



DATA SUMMARY KEY INORGANIC DATA VALIDATION

- **J** = The associated value is an estimated quantity.
- R = The data are unusable. (Note: Analyte may or may not be present).
- U = The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.
- UJ = The material was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

DATA SUMMARY FORM: TOTAL TAL METALS WATER SAMPLES (ug/L)

Site Name: Industri-Plex

STL Report No. 7000-2264A

	Sample Number	SW-04	SW-09												
	Lab ID	002264A-03	002264A-0)4			 							<u></u>	
	Date Sampled	05-Oct-00	05-Oct-00)	 		 								
CRDL					 	 il	 							<u></u>	انــــــــــــــــــــــــــــــــــــ
200	Aluminum	37.3 U	50.7 t	J		\Box		<u> </u>		l	<u> </u>				
60	Antimony	5.0 U	5.0 t	j		 	 	· 							
10	Arsenic	13.1	12.6			 	 	[ļ
200	Barium	27.1	26.0					i					ļ		<u> </u>
5	Beryllium	0.50 U	0.50 t	J			 	·							
5	Cadmium	1.2	0.50 L	J	 			İ	<u> </u>		<u> </u>				<u> </u>
5000	Calcium	41800	42600				 	i •					Ĺ		1
10	Chromium	1.3 J	2.2 J				 				<u> </u>		<u> </u>		
50	Cobalt	1.2 J	1.0 t	J							<u> </u>		ļ		<u> </u>
25	Copper	23.1	7.9 L	J	 								ļ		
100	Iron	996	1540				 				<u> </u>			<u></u>	
3	Lead	2.0 UJ	3.3 J					<u>.</u>					<u> </u>		1
5000	Magnesium	6280	6580		 	 	 	<u></u>		<u> </u>					
15	Manganese	310	383		 		_	; — · 	<u> </u>	<u>_</u> _	<u> </u>			! 	
0.2	Mercury	0.10 U	0.10 t	J	 		 _			<u> </u>			ļ	<u></u>	<u> </u>
40	Nickel	2.4 J	1.5 T	J	 	 _	 			L			ļ		
5000	Potassium	8150	8010		 _	 	 _	ļ 	_			ļ	ļ <u> </u>		
5	Selenium	5.0 UJ	5.0 L]]		 			_		<u> </u>		ļ		
10	Silver	1.0 U	1.0 U	J		 		ļ 					ļ	ļ 	
5000	Sodium	42700	44300										<u> </u>		
10	Thallium	6.0 UJ	6.0 t	J J				<u> </u>					ļ	<u> </u>	
50	Vanadium	1.0 U	1.0 U	J					<u></u>		<u> </u>				
20	Zinç	231	160											·	

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DATA SUMMARY FORM: SELECTED DISSOLVED METAL WATER SAMPLES (ug/L)

Site Name: Industri-Plex

STL Report No. 7000-2264A

	Sample Number	SW-04	4	SW-09	<u> </u>				 					 				
Lab ID					002264A-03		002264A-04	ļ]					 .	
	Date Sampled	05-Oct-	00	05-Oct-00					 	·								
					 		<u> </u>		 <u></u>									
RDL			,		<u> </u>		ļ		 \downarrow			-	- !	 				
10	Arsenic	2.5	ŭ	12.3				_		· 			ļ	 				
			ļ		<u> </u>		<u> </u>		 				-					
					<u> </u>	-	<u> </u>		 				-	++				
\dashv					 			 	 				 	+ +				
-+			 			-	 -	1	 i				_	 -				

\Roux SedTransport\2264in2

DATA SUMMARY FORM: TOTAL SUSPENDED SOLIDS WATER SAMPLES (mg/L)

Site Name: Industri-Plex

STL Report No. 7000-2264A

	Sample Number Lab ID Date Sampled	SW-09 002264A-03 05-Oct-00	SW-09 002264-04 05-Oct-00				
CRDL 5.0	TSS	5.0 U	5.0 U				

\Roux SedTransport\2264tss

REGIO	N I	
Data	Review	Worksheets

site	Name	Industri-Plex
Refer	ence	Number

REGION I REVIEW OF INORGANIC CONTRACT LABORATORY DATA PACKAGE

Trillium, Inc. The hardcopied (laboratory name) 571 (at Region I has been reviewed and the data summarized. The data review incl	quality assurance a	ckage received nd performance
Case No. 7000-2764A SAS No. SDG. No. of Samples 5	Sampling Date(s) Shipping Date(s) Date Rec'd by Lab	10/5/00 10/5/00 10/6/00
Traffic Report Nos: <u>SW-01, SW</u>	-10, 5W-04, 5W-09	7
Trip Blank No.: ————————————————————————————————————		
EPA-U010B/7470A sow No. 1100-1 requires that specifi associated reports be provided by the LV, and SMO. The general criteria used based on an examination of:	c analytical work be laboratory to the	Regions, EMSL
-Data Completeness -Holding Times -Calibrations -Blanks -ICP Interference Check Results -Matrix Spike Recoveries -Laboratory Duplicates	-Field Duplicate -Lab Control Sam -Furnace AA Resu -ICP Serial Dilu -Detection Limit -Sample Quantita	ple Results lts tion Results Results
Overall Comments: TierI Validation	- 5w-04 and 5	W-09 only
Definitions and Qualifiers:		
 A - Acceptable data. J - Approximate data due to quality R - Reject data due to quality contr U - Analyte not detected. 	control criteria.	
Reviewer: Caluksu	Date:	5/17/01 Car 5/18/01

REGION 1 Data Review Worksheets

I. DATA COMPLETENESS

MISSING INFORMATION	DATE LAB CONTACTED	DATE REC'D
Vau data	OK per client - no a	ction
sample pHs	5/14/01	5/17/01
		*

7000060101 01171 1077//0/

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REGION I . Data Review Worksheets

II. HOLDING TIMES Complete table for all samples and circle the analysis date for samples not within criteria.

SAMPLE ID	DATE SAMPLED	HG DATE ANALYSIS	CYANIDE DATE ANALYSIS	OTHERS DATE ANALYSIS	рĦ	ACTION
5W-04 5W-09	10/5/00	10/16-Prep 10-16-pur 10/16-Rep 10/16-pur		10/20-Prep 10/20-Prep 10/20-Aur	22 - 42	None

METALS - 180 DAYS FROM SAMPLE COLLECTION MERCURY - 28 DAYS FROM SAMPLE COLLECTION CYANIDE - 14 DAYS FROM SAMPLE COLLECTION

ACTION:

- 1. If holding times are exceeded all positive results are estimated (J) and non-detects are estimated (UJ).
- 2. If holding times are grossly exceeded, the reviewer may determine that non-detects are unusable (R).

REGION I Data Review worksheets

III A. INSTRUMENT CALIBRATION (Section 1)

1. Recovery Criteria

List the analytes which did not meet the percent recovery (%R) criteria for Initial or Continuing Calibration.

DATE 10/24/00	ccv3	ANALYTE Ni	3R 202.6	None	CC13 does not bracket lither validated spl
	· · · · · · · · · · · · · · · · · · ·				either Validated 8p1
					
	····				<u> </u>

ACTIONS:

CO DOM:

If any analyte does not meet the &R criteria follow the actions stated below:

For Positive Results:

	Accept	<u>Estimate (J)</u>	Reject (R)	
Metals	90-110%R	75-89%R, 111-125%R	<75年度, >125年度	
Mercury	80-120%R	65-79%R, 121-135%R	<65年度, >135年度	
Cyanide	85-115%R	70-84%R, 116-130%R	<70年度, >130年度	

For Non-detected Results:

	Accept	Estimate (UJ)	Reject (R)
Metals	90-125%R	75-89%R	<75%R, >125%R
Mercury	80-135%R	65-79%R	<65%R, >135%R
Cyanide	85-130%R	70-84%R	<70%R, >130%R

REGION I Data Review Worksheet

IV A. BLANK ANALYSIS RESULTS (Sections 1-3)

List the blank contamination in Secti

workshee	et should be us	ed for soi	n Sections 1 hand water bla	& 2 below. A separate inks.	
1. Lab	oratory Blanks			hatrix: AQ	
DATE	ICB/CCB1	PREP BL	ANALYTE	CONC./UNITS	Machier
10/24/00	ICB		Fe	-14.1 Mg1L	ODI
	<u>ICB</u>	,	K	362.0 Mg/L	-
	<u>ccbl</u>		(A1	20.7 Mg/L)
			Ma	. 12.9 Mg/L	
4				296.8 Mg/L	_
V	CCBI	-	TR	- 7.6 Mg/1	
2. Equi	pment/Trip Bl	anks		(cont.	next pg)
DATE	EOUIP BL#		ANALYTE	CONC. /UNITE	G
10/5/00	Field Blank	-	Al	13.8 Mg/L	
	· · · · · · · · · · · · · · · · · · ·		(Ba	0.90 ug/L	
			Ca	245 Mg/L)	
	·		Cu	3.7 Mg/L)
			Fe	32.6 ug/L	1a 258
			Mg	4 di 1 kg//	ing)!
3. Freq	uency Requireme	ents	Mn	3.7 Mg/L)	n 9.9441
Α.	Was a preparat for every 20 s batch?	ion blank amples and	analyzed for each diges	ach matrix,	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
				. Yes or No	
В.	Was a calibrat every 2 hours	ion blank whichever	run every 10 s is more freque	amples or nt? Yes or No	
If No,					

The data may be affected. Use professional judgement to determine the severity of the effect and qualify the data accordingly. Discuss any actions below, and list the samples affected.

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IV A. BLANK ANALYSIS RESULTS (Sections 1-3)

List the blank contamination in Sections 1 & 2 below.

work	kshee	t should be us	ed for soil a	nd water blanks	. nerow: w sabate	1 (4
1.	Labo	ratory Blanks			MATRIX: AQ	-
<u>DAT</u>	Ε	ICB/CCB#	PREP BL	ANALYTE	CONC, /UNITS	
10/2	4/00	CCBO		<u>A1</u>	10.8 ug/L	_
1	••	II .		K	302.8 Mg	1
		CCB3		15.1 Al	15.1 Mg1	L
		1		K	487.2 M	61 L
				Na	34.0 Mg	
				7100	_ <u>54.0 Mg</u>	<i>[</i> _
					(cont	. ne
2.	Equip	pment/Trip Bl	anks			
DATE	2	EQUIP BL#	۵	NALYTE	CONC. /UNITS	
	<u>-</u>					
					····	
			_			
3.	Frequ	uency Requirem	ents		-	
	A.			alyzed for each or each digesti		
		batch?	samples and I	or each digesti	yes or	No
	В.			n every 10 samp		
		every 2 hours	whichever is	more frequent?	Yes or	No
If h	10,					
	The	data may be at	ffected. Use	professional ju	idgement to determi	ne
the anv	seve	rity of the e	ffect and qua	lify the data a ples affected.	ccordingly. Discu	5 5
						_

IV A. BLANK ANALYSIS RESULTS (Sections 1-3)

	ooratory Blanks		and water blanks		AQ
DATE	ICB/CCB#	PREP BL	ANALYTE	CONC.	/UNITS
10124100	<u>#</u> _	PBW	<u> </u>	16.	23 Mg/L
			K	27	9-88 Mg
			$\frac{Zn}{}$	_13.	48 MgIL
iolariao	ccb4		_A-1_	19	·8 ug/L
+			<u> </u>	<u> 11.</u> 2	7,491L
2. Equ	ipment/Trip Bla	nks			7)
DATE	EQUIP BL#		ANALYTE	CONC	/UNITS
		·	<u> </u>		
	1	·			
	Vojeta att.				
	·				
	<u>~.</u>				
3. Free	quency Requireme	nts			-
A.	Was a preparat for every 20 s. batch?	ion blank a amples and	nalyzed for each : for each digestion	matrix, n	
В.				٠	Yes or No
υ.	every 2 hours	dichever i	un every 10 sample s more frequent?	es or	Yes or No
If No,					
W.F.	Ast				

any actions below, and list the samples affected.

REGION I Data Review Worksheets

IV B. BLANK ANALYSIS RESULTS (Section 4)

4. Blank Actions

The Action Levels for any analyte is equal to five times the highest concentration of that element's contamination in any blank. The action level for samples which have been concentrated or diluted should be multiplied by the concentration/dilution factor. No positive sample result should be reported unless the concentration of the analyte in the sample exceeds the Action Level (AL). Specific actions are as follows:

- 1. When the concentration is greater than the IDL, but less than the Action Level, report the sample concentration detected with a U.
- 2. When the sample concentration is greater than the Action Level, report the sample concentration unqualified.

MATRIX:_	AQ			MATRIX:	AQ
ELEMENT	MAX. CONC./ UNITS	AL/ UNITS	ELEMENT	MAX. CONC./ UNITS	UNITS USITE
Al	20.7 Mg/L		K	487.2 mg/L	WITS 2436 COUSTAION 2436 MIL
Ba	0-90 Mg/L	4.5 ug/L	Na	258 ugll	1890 Mg/L
<u>Ca</u>	265 ugil		虹		1.71
<u>Cu</u>	3.7 ug1		Zn	13.48 Mg/L	67.1 ugil
Iron	32.6 Majl	-	<u></u>	7/2	THE WALL
Mg	H2-1 ugil	18.5 May 1		-7.6 mg/	samples
Mn_	3. tugil	18.5 ugil			<u>, </u>

NOTE: Blanks analyzed during a soil case must be converted to mg/kg in order to compare them with the sample results.

Conc. in ug/L X Volume diluted to (200ml) X 1L X 1000gm X 1mg = mg/kg Weight digested (1gram) 1000ml 1kg 1000ug

Multiplying this result by 5 to arrive at the action level gives a final result in mg/kg which can then be compared to sample results.

REGION I Data Review Worksheets

VI. MATRIX SPIKE

TR	#	-5w-09

HATRIX: AQ

1. Recovery Criteria

List the percent recoveries for analytes which did not meet the required criteria.

S - amount of spike added SSR - spikes sample result SR - sample result

Analyte	SSR	SR	5	₹ R	Action
pb Se	15.46	3.31 5.04	20	60.8	J, UJ UT:
					<u> </u>
					
	 -		·	i	
					
			· · · · · · · · · · · · · · · · · · ·		
	l	l	<u> </u>		i

Matrix Spike Actions apply to all samples of the same matrix.

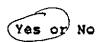
ACTIONS:

- 1. If the sample concentration exceeds the spike concentration by a factor of 4 or more, no action is taken.
- 2. If any analyte does not meet the &R criteria follow the actions stated below:

	PE	RCENT RECOVERY	٠.
	<301	304-744	<u>>125%</u> —
Positive Sample Results	J	J	3
Non-detected Results	R	UJ	λ

2. Frequency Criteria

A. Was a matrix spike prepared at the required frequency?



B. Was a post digestion spike analyzed for elements that did not meet required criteria for matrix spike recovery?

Ph 84.5% Sc105.844 (Yes or N

A separate worksheet should be used for each matrix spike pair.



356 FARRAGUT CROSSING DR. KNOXVILLE, TN 37922

> (423) 966-8880 FAX (423) 966-8885 cerikson@trilliuminc.com

May 14, 2001

Mr. Larry McTiernan Roux Associates, Inc. 25 Corporate Drive Suite 230 Burlington, MA 01803

Subject: STL Connecticut Report No. 7000-2264A

Downgradient Transport (Surface Water and Sediments) Investigation

Industri-Plex Site

Woburn, Massachusetts

SVOCs: 4/Surface Waters/SW-01, SW-10, SW-04, SW-09

(Field Duplicates: SW-01/SW-10)

1/Field Blank

Dear Mr. McTiernan:

A Tier II validation was performed on the organic analytical data for two surface water samples collected by Roux Associates, Inc. at the Industri-Plex Site in Woburn, Massachusetts and reported in the above-referenced laboratory report. Several additional samples were also reported in this data package, but, per project specifications, only the results for SW-04 and SW-09 were validated. All of the samples were analyzed according to EPA Method 8270C for semivolatile organic compounds (SVOCs). For SW-04 and SW-09, the full TCL (target compound list, per the Contract Laboratory Program), with cyclohexanone added as a target analyte, was reported.

The data were evaluated as Tier II level in accordance with the "Region I EPA NE Data Validation Functional Guidelines for Evaluating Environmental Analyses" dated December 1996, and the project-specific Quality Assurance Project Plan (QAPP), dated September 14, 1999. The evaluation was based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues.
- Data Completeness.
- Preservation and Technical Holding Times.
- NA Gas Chromatography/Electron Capture Detector (GC/ECD) Instrument Performance Checks.
- Initial and Continuing Calibration.

HOME OFFICE:



Mr. Larry McTiernan 14 May 2001 Page 2

- Blanks.
- Surrogate Compounds.
- Internal Standards.
 - Matrix Spike (MS)/Matrix Spike Duplicates (MSD).
- * Field Duplicates.
 - Sensitivity Check (Method Detection Limit Study or Laboratory Fortified Blank).
- NA PE Samples/Accuracy Check.
- NA Target Compound Identification.
- NA Sample Quantitation and Reported Quantitation Limits.
- NA SVOC and Pesticides Cleanup.
- NA System Performance.
- * = All criteria were met for this parameter.
- NA = Not Applicable.

Note: Worksheets for QC parameters that met criteria or are not applicable to the method will not be included as attachments to this document.

Table I summarizes the validation recommendations which were based on the following information. Table II summarizes the overall evaluation of the data with reference to the data quality objectives (DQOs) and potential usability issues.

Overall Evaluation of Data and Potential Usability Issues

The DQO for this site is to collect data of sufficient quality to allow a technically sound evaluation of sediment fate and transport, as well as impacts to surface water, in the Hall's Brook Holding Area (HBHA), located just downstream of the Industri-Plex site. The primary intended use for the data is to determine if the HBHA sediments are being entrained and/or transported out of the HBHA during storm events. The primary analytical objective is that measurements be representative of the actual site conditions and that data resulting from field sampling and analysis activities be comparable.

SVOC sample results were qualified as the result of measurement error, which in this case includes only analytical (laboratory) error. Measurement error associated with sample analysis includes method blank contamination and poor LFB performance. There were two major impacts on data usability:

- The result for pentachlorophenol in SW-04 was rejected because this compound was not recovered in the laboratory fortified blank analysis.
- Results for bis(2-ethylhexyl)phthalate in SW-04 and SW-09 were qualified as less than
 the sample-specific contract required quantitation limits due to contamination in the
 associated method blank.



Mr. Larry McTiernan 14 May 2001 Page 3

Data Completeness

No raw data were included in the data package. This is inconsistent with Region I guidelines, which specify that full Tier III deliverables are to be provided for all data packages no matter what level of validation is to be performed. However, the lack of raw data is acceptable to the client and does not adversely affect the Tier II validation effort. Therefore, no further action was taken on this basis.

Blanks

The following compound was reported in the associated method blank:

Compound	Blank Type	Max Conc.	Action Limit	Action
Compound	Blank Type	Conc.	Action Limit	Action
bis(2-ethylhexyl)phthalate	Method	1 μg/L	10 μg/L	U

Results for bis(2-ethylhexyl)phthalate in SW-04 and SW-09 were qualified as less than the sample-specific contract required quantitation limits (U) based on the associated method blank contamination.

Surrogates

An unacceptably high recovery (126%; QC 35-114%) was reported for nitrobenzene-d₅ in SW-04 (126%). Since only one surrogate recovery was unacceptable in this analysis, no qualifiers were warranted.

Matrix Spike/Matrix Spike Duplicate

Unacceptably high recoveries were reported for 1,2,4-trichlorobenzene (107% and 102%; QC 39-98%) in both spiked analyses and for pentachlorophenol (109%; QC 9-103%) in the MS. No action was warranted on this basis.

Laboratory Fortified Blank

Recovery of 2,4-dinitrophenol (58%) was unacceptably low (QC 70-139%) in the laboratory fortified blank analysis. Results for 2,4-dinitrophenol in SW-04 and SW-09 were qualified as estimated (UJ) on this basis.

Although acceptance limits of 0-25% were designated by the laboratory on the summary form in the data package, acceptable recovery was not demonstrated for benzoic acid in the laboratory fortified



Mr. Larry McTiernan 14 May 2001 Page 4

blank analysis associated with these samples, based on the validator's professional judgment (22%). Results for benzoic acid in SW-04 and SW-09 were qualified as estimated (UJ) on this basis.

Pentachlorophenol (at 40 μ g/L) was not recovered (0%) in the laboratory fortified blank (QC 63-125%). However, SW-09 was also prepared and analyzed as a matrix spike/matrix spike duplicate pair. The MS/MSD spiking solution includes pentachlorophenol (at 100 μ g/L), and very good recoveries (109% and 100%) were obtained for this compound in the spiked analyses of SW-09. Therefore, based on professional judgment, the result for pentachlorophenol in SW-04 was rejected (R) as unreliable due to the lack of recovery in the laboratory fortified blank. The result for pentachlorophenol in SW-09 was qualified as estimated (UJ), rather than being rejected, based on the acceptable recoveries of pentachlorophenol in the spiked analyses of this sample, which mitigate the lack of recovery for this analyte in the laboratory fortified blank.

The laboratory, however, should investigate the poor laboratory fortified blank recoveries and implement appropriate corrective action. Poor recoveries in a blank spike analysis are indicative of a potentially serious problem in the analytical process.

Please contact the undersigned at (865) 966-8880 if you have any questions or need further information.

Very truly yours,

TRILLIUM, INC.

Carol A. Erikson

Quality Assessment Manager

Caralla Erikson

CAE/psn

Attachments: Table I: Recommendation Summary

Table II: Overall Evaluation of Data

Data Summary Key

Data Validation (DV) Worksheet

Data Summary Table

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TABLE I

INDUSTRI-PLEX SITE

STL Connecticut Report #7000-2264A

Recommendation Summary

Sample Nos.	Matrix	TCL SVOCs
SW-04	AQ	A^{1}, J^{1}, R^{1}
SW-09	AQ	$A^{1}, J^{1,2}$

AQ - aqueous

- A¹ = Accept the results for the sample, but qualify the result for bis(2-ethylhexyl)phthalate as not detected (U) at the sample-specific CRQL based on method blank contamination.
- J¹ = Estimate (J, UJ) the results for 2,4-dinitrophenol and benzoic acid due to poor recoveries in the laboratory fortified blank.
- J² = Estimate (UJ) the result for pentachlorophenol due to no recovery in the laboratory fortified blank but acceptable recoveries in the matrix spikes using this sample.
- R¹ = Reject (R) the result for pentachlorophenol due to no recovery in the laboratory fortified blank.

TABLE II

INDUSTRI-PLEX SITE STL REPORT #7000-2264A Overall Evaluation of Data

	Semivolatile Organic Compounds (SVOCs)							
DQOs (list all DQOs)	Sampling and/or Analytical Method Appropriate Yes or No	Measurement Error		Measurement Error		Sampling Variability**	Potential Usability Issues	
		Analytical Error	Sampling Error*					
The DQO for this site is to collect data of sufficient quality to: 1. Allow a technically sound evaluation of sediment fate and transport, as well as impacts to surface water, in the Hall's Brook Holding Area (HBHA), located just downstream of the Industri-Plex site. 2. Determine if the HBHA sediments are being entrained and/or transported out of the HBHA during storm events. 3. Be representative of the actual site conditions and comparable to other data generated in support of this project.	Analytical Method: Yes SW-846 Method 8270C Sampling Method: Yes Grab	Refer to qualifications in Table I A ¹ J ^{1,2} R ¹	None		1. Lack of recovery of pentachlorophenol in the laboratory fortified blank analysis renders results for this compound unusable in SW-04. Acceptable MS/MSD recoveries for this compound led to qualification of the result for pentachlorophenol in SW-09 as estimated, rather than rejected. 2. Results for 2,4-dinitrophenol and benzoic acid in both samples were estimated due to poor laboratory fortified blank recoveries. 3. Results for bis(2-ethylhexyl)phthalate in both samples were qualified as less than the sample-specific CRQLs due to method blank contamination.			

- * The evaluation of "sampling error" cannot be completely assessed in data validation.
- ** Sampling variability is not assessed in data validation.

DATA SUMMARY KEY ORGANIC DATA VALIDATION

The associated numerical value is an estimated quantity.

J =

R = The data are unusable (compound may or may not be present). Resampling and reanalysis are necessary for verification. The R replaces the numerical value or sample quantitation limit.

U = The compound was analyzed for, but not detected. The associated numerical value is the sample quantitation limit or the adjusted sample quantitation limit.

UJ = The compound was analyzed for, but not detected. The associated numerical value is the estimated sample quantitation limit.

DATA SUMMARY TABLE - TCL SEMIVOLATILE ORGANICS 1 WATER SAMPLES (ug/L)

Site Name: Industri-Plex

STL Report #7000-2264A

Sample Number	SW-04	SW-09			
Lab ID	002264A-03	002264A-04			
Dilution Factor*	1.18	1.39			
Date Sampled	05-Oct-00	05-Oct-00			
Date Extracted	09-Oct-00	09-Oct-00			<u> </u>
Date Analyzed	11-Oct-00	11-Oct-00			`
CRQL**		<u> </u>			
10 Cyclohexanone					<u> </u>
10 Phenol					
10 bis(2-Chloroethyl)ether					
10 2-Chlorophenol					·
10 1,3-Dichlorobenzene					
10 1,4-Dichlorobenzene					
10 Benzyl alcohol					
10 1,2-Dichlorobenzene				_	
10 2-Methylphenol					
10 bis(2-chloroisopropyl)ether		! 			
10 4-Methylphenol					<u> </u>
10 N-Nitroso-di-n-propylamine		l			<u> </u>
10 Hexachloroethane					
10 Nitrobenzene					
10 Isophorone					
10 2-Nitrophenol			 		
10 2,4-Dimethylphenol		<u> </u>			
50 Benzoic acid	69 J	UJ			
10 bis(2-Chloroethoxy)methane		<u> </u>			
10 2,4-Dichlorophenol					
10 1,2,4-Trichlorobenzene					
10 Naphthalene					

^{*} includes adjustment for use of a sample volume slightly smaller than 1000 mL

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^{**} blank spaces mean the analyte was not detected; sample-specific CRQLs are equal to unadjusted CRQL times the DF

DATA SUMMARY TABLE - TCL SEMIVOLATILE ORGANICS 2 WATER SAMPLES (ug/L)

Site Name: Industri-Plex

STL Report #7000-2264A

Sample Number	SW-04	SW-09								
Lab ID	002264A-03	002264A-04			_					
Dilution Factor*	1.18	1.39								
Date Sampled	05-Oct-00	05-Oct-00								
Date Extracted	09-Oct-00	09-Oct-00								
Date Analyzed	11-Oct-00	11-Oct-00								
CRQL**				_						
10 4-Chloroaniline										
10 Hexachlorobutadiene										 i
10 4-Chloro-3-methylphenol							·· -			
10 2-Methylnaphthalene									ļ	
10 Hexachlorocyclopentadiene										
10 2,4,6-Trichlorophenol					[_					
50 2,4,5-Trichlorophenol										
10 2-Chloronaphthalene										
50 2-Nitroaniline	<u> </u>		ļ		1					
10 Dimethylphthalate				_			.			
10 Acenaphthylene			<u> </u>							
10 2,6-Dinitrotoluene				_				_		
50 3-Nitroaniline					j					
10 Acenaphthene									L	
50 2,4-Dinitrophenol	UJ	เม						_		
50 4-Nitrophenol										
10 Dibenzofuran			ļ							
10 2,4-Dinitrotoluene				_			<u></u>			
10 Diethylphthalate					<u> </u>					
10 4-Chlorophenyl-phenylether										
10 Fluorene										
50 4-Nitroaniline								1	<u> </u>	

^{*} includes adjustment for use of a sample volume slightly smaller than 1000 mL

\Roux SedTransport\2264SV

^{**} blank spaces mean the analyte was not detected; sample-specific CRQLs are equal to unadjusted CRQL times the DF

DATA SUMMARY TABLE - TCL SEMIVOLATILE ORGANICS 3 WATER SAMPLES (ug/L)

Site Name: Industri-Plex

STL Report #7000-2264A

	Sample Number	SW-04	SW-09							
	Lab ID	002264A-03	002264A-04			 				
	Dilution Factor*	1.18	1.39]						
li I	Date Sampled	05-Oct-00	05-Oct-00			 			_	
	Date Extracted	09-Oct-00	09-Oct-00							
ĺ	Date Analyzed	11-Oct-00	11-Oct-00			 			_	
CRQL**				<u> </u>	<u> </u>					
50	4,6-Dinitro-2-methylphenol									
10	N-Nitrosodiphenylamine					 :	1			
	4-Bromophenyl-phenylether			<u> </u>					<u> </u>	
10	Hexachlorobenzene									
50	Pentachlorophenol	R	UJ					_		
10	Phenanthrene				<u> </u>					
10	Anthracene					 				
10	Di-n-butylphthalate									
10	Fluoranthene				<u> </u>		!	!		
10	Pyrene			i		 <u> </u>	<u> </u>			
10	Butylbenzylphthalate					 		:		
20	3,3'-Dichlorobenzidine				ļ	 ļ	1			
10	Benzo(a)anthracene									
10	Chrysene					 	<u> </u>			
10	bis(2-Ethylhexyl)phthalate	12 U	14 U			 				
10	Di-n-octylphthalate			<u> </u>		 :				
10	Benzo(b)fluoranthene					-				
10	Benzo(k)fluoranthene									
10	Benzo(a)pyrene					ļ ,	1			
10	Indeno(1,2,3-cd)pyrene						<u> </u>			
	Dibenz(a,h)anthracene					 <u>!</u>				
10	Benzo(g,h,i)perylene							<u>. </u>		

^{*} includes adjustment for use of a sample volume slightly smaller than 1000 mL

\Roux SedTransport\2264SV

^{**} blank spaces mean the analyte was not detected; sample-specific CRQLs are equal to unadjusted CRQL times the DF

Site Name	Industri-Plex
Reference l	

REGION I ORGANIC DATA VALIDATION

The following data package has been validated:	
Lab Name STL Connecticut Case/Project No. SDG No. 1000-2244A No. of Samples/Matrix 5/AQ	SOW/Method No. EPA 8270C Sampling Date(s) 10/5/00 Shipping Date(s) 10/5/00 Date Rec'd by lab 10/6/00
Traffic Report Sample Nos. 5w-01, 5	W-10, SW-04, SW-09
Trip Blank No	
The Region I. EPA-NE Data Validation Functional Gurevision 196 was used to evaluate the data Functional Guidelines were used to evaluate the data an criteria from EPA approved QAPjP or amendment to	and/or approved modifications to the EPA-NE d are attached to this cover page: (attach modified
A Tier II or Tier III evaluation was used to validate the partial Tier III was used, then identify samples, param	te data (circle one). If a Tier II validation with a eters, etc. that received partial Tier III validation
Sw-04 and Sw-09	only.
The data were evaluated based upon the following par	ameters:
 Overall Evaluation of Data Data Completeness (CSF Audit - Tier I) Preservation & Technical Holding Times GC/MS & GC/ECD Instrument Performance Check Initial & Continuing Calibrations Blanks Surrogate Compounds Internal Standards Matrix Spike/Matrix Spike Duplicate 	 Field Duplicates Sensitivity Check PE Samples/Accuracy Check Target Compound Identification Compound Quantitation and Reported Quantitation Limits TICs Semivolatile and Pesticide/PCB Cleanup System Performance
Region I Definitions and Qualifiers:	
A - Acceptable Data J - Numerical value associated with compound is an R - The data are rejected as unusable. The R replaces U - Compound not detected at that numerical sample UJ - The sample quantitation limit is an estimated qua TB, BB, EB - Compound detected in aqueous trip bla blank associated with soil/sediment samples.	the numerical value or sample quantitation limit. quantitation limit. ntity.
Validator's Name Carol A ErikSon Company N	ame Trillium Tuc Phone Number 84 59448880
Date Validation Started 5/18/01	Date Validation Completed 5/14/01

Data Validation Worksheet Cover Page - Page 2

Check if all criteria are met and no hard copy worksheet provided. Indicate NA if worksheet is not applicable to analytical method. Note: there is no standard worksheet for System Performance, however, the validator must document all system performance issues in the Data Validation Memorandum.

VOA/SV worksheets:

	VOA/SV-Pest/PCB VOA/SV-Pest/PCB-I	COMPLETE SDG FILE (CSF) AUDIT PRESERVATION AND HOLDING TIMES	/- -
	VOA/SV-PSUFCB-1 VOA/SV-II	GC/MS INSTRUMENT PERFORMANCE CHECK (TUNING)	/-
	VOA/SV-III	INITIAL CALIBRATION	
	VOA/SV-IV	CONTINUING CALIBRATION	
	VOA/SV-Pest/PCB-V-A	BLANK ANALYSIS	
	VOA/SV-Pest/PCB-V-B	BLANK ANALYSIS	
	VOA-VI	VOA SURROGATE SPIKE RECOVERIES	NA
	SV-VI	SV SURROGATE SPIKE RECOVERIES	
	VOA/SV-VII	INTERNAL STANDARD PERFORMANCE	7
	VOA/SV-Pest/PCB-VIII	MATRIX SPIKE/MATRIX SPIKE DUPLICATE	
	VOA/SV-Pest/PCB-IX	FIELD DUPLICATE PRECISION	
	VOA/SV-Pest/PCB-X	SENSITIVITY CHECK	
	VOA/SV-Pest/PCB-XI	ACCURACY CHECK	NA
	VOA/SV-Pest/PCB-XII	TARGET COMPOUND IDENTIFICATION	NA
	VOA/SV-Pest/PCB-XIII	SAMPLE QUANTITATION	NA
	VOA/SV-XIV	TENTATIVELY IDENTIFIED COMPOUNDS	NA
	VOA/SV-XV	SEMIVOLATILE CLEANUP	MA
	TABLE II-WORKSHEET	OVERALL EVALUATION OF DATA	/4//
Pest/PC	CB worksheets:		4
	VOA/SV-Pest/PCB	COMPLETE SDG FILE (CSF) AUDIT	NA
	VOA/SV-Pest/PCB-I	PRESERVATION AND HOLDING TIMES	
•••	Pest/PCB-IIA	GC/ECD INSTRUMENT PERFORMANCE CHECK-	
		RESOLUTION	
	Pest/PCB-IIB	GC/ECD INSTRUMENT PERFORMANCE CHECK-	- 1
		RETENTION TIMES	
	Pest/PCB-IIC	GC/ECD INSTRUMENT PERFORMANCE CHECK-	1
		ACCURACY CHECK OF INITIAL CALIBRATION	
	Pest/PCB-IID	GC/ECD INSTRUMENT PERFORMANCE CHECK-	1
		PESTICIDE DEGRADATION	
	Pest/PCB-III	INITIAL CALIBRATION	
	Pest/PCB-IV	CONTINUING CALIBRATION	
	VOA/SV-Pest/PCB-V-A	BLANK ANALYSIS	
	VOA/SV-Pest/PCB-V-B	BLANK ANALYSIS	
	Pest/PCB-VI	SURROGATE COMPOUNDS:	- 1
	Dawmen Mil	SPIKE RECOVERIES AND RETENTION TIME SHIFT	
	Pest/PCB-VII	PESTICIDE CLEANUP	
	VOA/SV-Pest/PCB-VIII	MATRIX SPIKE/MATRIX SPIKE DUPLICATE	
	VOA/SV-Pest/PCB-IX	FIELD DUPLICATE PRECISION	
	VOA/SV-Pest/PCB-X	SENSITIVITY CHECK	
	VOA/SV-Pest/PCB-XI	ACCURACY CHECK	
	Pest/PCB-XII	COMPOUND IDENTIFICATION	
	VOA/SV-Pest/PCB-XIII	SAMPLE QUANTITATION	
	TABLE II-WORKSHEET	OVERALL EVALUATION OF DATA	

I certify that all criteria were met for the worksheets checked above.

Signature: Carala Eniksor	Name: Carol A. Eriksor
_ate: _5/14/01	

EPA-NE -	Data	Validation	Worksheet
VOA/SV -	Pest.	PCB-V-A	

V.	BI.	ANI	ζΔ	N/	41.	YSIS
			L [1]			1 4 7 1 4

List the blank contamination below.			Concentration I	Level: Low
Sampler: Chris Milone	Company: Row Assoc, Inc.	Contacted:	Yes No	Date:

1. Laboratory: Method, Storage and Instrument Blanks

Date Extracted	Date Analyzed	Parameter/ Matrix	Sample No. (Blank Type)	Instrument/ Column	Compound	Conc. (units)
10 9 00	10/11/00	SV	SPLKIO/metho	L HP5971Q	BREHP	1 mg/L
				· · · · · · · · · · · · · · · · · · ·		

2. Field: Equipment (Rinsate), Trip and Bottle Blanks

Date Extracted	Date Analyzed	Parameter/ Matrix	Sample No. (Blank Type)	Instrument/ Column	Compound	Conc. (units)

<u></u>	<u> </u>	 	 		<u> </u>	
Validator:_	CAEriksor—			Date:	5/4/01	

3. Blank Actions - List the maximum concentrations of blank compounds.

Compound	Type of Blank	Date Blank Sampled/Originated	Max. Conc. (units)	Action Level (units)	Sample QL	Samples Affected	Action
BZEHP	method	10/1/00	1 ugl	10 Mg/L	10	5W-04, -09	U
							<u> </u>
			·				
		•					
•							

Comments:	
Validator:	Date: 5/p/0/

VI. SV SURROGATE SPIKE RECOVERIES - List all surrogate compound recoveries that are outside method QC acceptance criteria.

		Bas	se/Neutral Method Q	C Acceptance Crite	ria	
Method	NBZ-d ₅	2-FBP	TPH-d _{t4}	1,2-DCB-d,*	Other:	
OLM03.2	Water Soil 35-114 23-120	Water Soil 43-116 30-115	<u>Water Soil</u> 33-141 18-137	<u>Water Soil</u> 16-110 20-130		
OLC02.1	40-110	30-110	20-140	NA		
Other:						
Sample Number/Matrix	% Recovery	% Recovery	% Recovery	% Recovery	% Recovery	Action
5W-04/AQ	12690	_				Noue
			Asid Method OC A			
			Acid Method QC A	cceptance Criteria		
Method	Phenol-d ₅	2-FP		2-CP-d,*	Other:	<u> </u>
Method OLM03.2	Phenol-d ₃ Water Soil 10-110 24-113	2-FP <u>Water Soil</u> 21-110 25-121	2,4,6-TBP <u>Water Soil</u> 10-123 19-122		Other:	
	· · · · · · · · · · · · · · · · · · ·		2,4,6-TBP	2-CP-d ₄ *	Other:	
OLM03.2	Water Soil 10-110 24-113	<u>Water Soil</u> 21-110 25-121	2,4,6-TBP <u>Water</u> <u>Soil</u> 10-123 19-122	2-CP-d ₄ * <u>Water Soil</u> 33-110 20-130	Other:	
OLM03.2 OLC02.1	Water Soil 10-110 24-113	<u>Water Soil</u> 21-110 25-121	2,4,6-TBP <u>Water</u> <u>Soil</u> 10-123 19-122	2-CP-d ₄ * <u>Water Soil</u> 33-110 20-130	Other:	Action
OLM03.2 OLC02.1 Other:	Water Soil 10-110 24-113 15-115	<u>Water Soil</u> 21-110 23-121 15-110	2,4,6-TBP <u>Water</u> <u>Soil</u> 10-123 19-122 15-130	2-CP-d ₄ * <u>Water Soil</u> 33-110 20-130 NA		Action
OLM03.2 OLC02.1 Other:	Water Soil 10-110 24-113 15-115	<u>Water Soil</u> 21-110 23-121 15-110	2,4,6-TBP <u>Water</u> <u>Soil</u> 10-123 19-122 15-130	2-CP-d ₄ * <u>Water Soil</u> 33-110 20-130 NA		Action
OLM03.2 OLC02.1 Other:	Water Soil 10-110 24-113 15-115	<u>Water Soil</u> 21-110 23-121 15-110	2,4,6-TBP <u>Water</u> <u>Soil</u> 10-123 19-122 15-130	2-CP-d ₄ * <u>Water Soil</u> 33-110 20-130 NA		Action
OLM03.2 OLC02.1 Other:	Water Soil 10-110 24-113 15-115	<u>Water Soil</u> 21-110 23-121 15-110	2,4,6-TBP <u>Water</u> <u>Soil</u> 10-123 19-122 15-130	2-CP-d ₄ * <u>Water Soil</u> 33-110 20-130 NA		Action
OLM03.2 OLC02.1 Other:	Water Soil 10-110 24-113 15-115	<u>Water Soil</u> 21-110 23-121 15-110	2,4,6-TBP <u>Water</u> <u>Soil</u> 10-123 19-122 15-130	2-CP-d ₄ * <u>Water Soil</u> 33-110 20-130 NA		Action
OLM03.2 OLC02.1 Other:	Water Soil 10-110 24-113 15-115	<u>Water Soil</u> 21-110 23-121 15-110	2,4,6-TBP <u>Water</u> <u>Soil</u> 10-123 19-122 15-130	2-CP-d ₄ * <u>Water Soil</u> 33-110 20-130 NA		Action

* Advisory Surrogates - OLM03.2

Validator: Caguit Gor

Date: 5/40/

EPA-NE - Data Validation Worksheet VOA/SV - Pest/PCB-VIII

VIII. MATRIX SPIKE/MATRIX SPIKE DUPLICATE - List all MS/MSD analytes that are outside method QC acceptance criteria.

Use a separate worksheet for each MS/MSD pair.

Matrix <u>AQ</u>

Concentration Level <u>low</u>

Action
None
Nove

<u> </u>

Validator: Cagriksor—	Date: <u>5/12/01</u>
-----------------------	----------------------

EPA-NE - Da VOA/SV - Pe	ita Validation Wo est/PCB-X	orksheet					
X. SENSITI	VITY CHECK	(Method D	etection Limit S	tudy)			
` List all	l compounds, sur	rogates, and	d internal standar	ds that are outside t	the MDL crite	eria.	
Has anDate oInstrum	appropriate MD f Preparation/An nent I.D.:	L study bee	en submitted with Within 1 yes samples?	seven replicates fo			of interest? Y N Y N Y N Y N
Matrix	Compound	MDL > QL	Method QC Limits < 80% or > 120%	IS Outside Area Count and/or RT Criteria	RSD > 20%	Samples Affecte	ed Action
							
	 			-			
						-	
				<u> </u>			
(Laboratory) Has an	Fortified Blank)	- List all L	FB compounds, :	results to evaluate surrogates and intered at the proper frequired QLs? (vendor) independent	nal standards		criteria. Y N Y N Can+tell
Matrix	Compour	1 :	Method QC Limits < 60% or > 140% Other:	IS Outside Area Count and/or RT Criteria	Samp	oles Affected	Action
AQ	bergoic aci	- 1	72% (OCO-			_	5, W
AQ	24 dinitrop		 	13970			2-5W04
AQ	pentachloroph	<u>1enol</u>	<u>0 (63-12</u>	52)	<u> </u>		UT-5W09
Validator:	Carol Erikso	n			Da	nte:5/12/01	1

Fall Storm 1



356 FARRAGUT CROSSING DR. KNOXVILLE, TN 37922

> (423) 966-8880 FAX (423) 966-8885 cerikson@trilliuminc.com

Mr. Larry McTiernan Roux Associates, Inc.

25 Corporate Drive

Suite 230

May 18, 2001

Burlington, MA 01803

Subject:

STL Connecticut Report No. 7000-2279A

Downgradient Transport (Surface Water and Sediments) Investigation

Industri-Plex Site

Woburn, Massachusetts

Total TAL Metals: 2

2/Surface Waters/SW-04, SW-09

1/Field Blank

Selected Total Metals:

8/Surface Waters/SW-01, SW-10, SW-02, SW-03,

SW-05, SW-06, SW-07, SW-08

(Field Duplicates: SW-01/SW-10)

Dissolved Arsenic:

10/Surface Waters/SW-01, SW-10, SW-02, SW-03, SW-

04, SW-05, SW-06, SW-07, SW-08, SW-09

(Field Duplicates: SW-01/SW-10)

1/Field Blank

Total Suspended Solids:

10/Surface Waters/SW-01, SW-10, SW-02, SW-03,

SW-04, SW-05, SW-06, SW-07, SW-08, SW-09

(Field Duplicates: SW-01/SW-10)

1/Field Blank

Dear Mr. McTiernan:

A Tier II validation was performed on the inorganic analytical data for two surface water samples collected by Roux Associates, Inc. at the Industri-Plex Site in Woburn, Massachusetts. Several additional samples were also reported in this data package, but, per project specifications, only the results for SW-04 and SW-09 were validated. The samples were analyzed according to EPA Methods 6010B/7470A, as applicable, for metals and EPA Method 160.2 for TSS. For SW-04 and SW-09, the full TAL (target analyte list, per the Contract Laboratory Program) was reported for the total metals fraction and arsenic only was reported for the dissolved fraction.

The data were evaluated as Tier II level in accordance with the "Region I Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses" dated June 13, 1988, and the project-

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Mr. Larry McTiernan 18 May 2001 Page 2

specific Quality Assurance Project Plan (QAPP). The evaluation was based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues.
- Data Completeness.
- Preservation and Technical Holding Times.
- * Instrument Calibration.
- Contract Required Detection Limit (CRDL) Standards.
 - Blanks.
 - Inductively Coupled Plasma (ICP) Interference Check Samples.
- Matrix Spike (MS).
- * Laboratory Duplicates.
- * Field Duplicates.
- Laboratory Control Sample.
- ICP Serial Dilution Analysis.
- * Detection Limit Results.
- NA PE Samples/Accuracy Check.
 - Sample Quantitation
- * = All criteria were met for this parameter.
- NA = Not Applicable.

Note: Worksheets for QC parameters that met criteria or are not applicable to the method will not be included as attachments to this document.

Table I summarizes the validation recommendations which were based on the following information. Table II summarizes the overall evaluation of the data with reference to the data quality objectives (DQOs) and potential usability issues.

Overall Evaluation of Data and Potential Usability Issues

<u>Metals</u>

The DQO for this site is to collect data of sufficient quality to allow a technically sound evaluation of sediment fate and transport, as well as impacts to surface water, in the Hall's Brook Holding Area (HBHA), located just downstream of the Industri-Plex site. The primary intended use for the data is to determine if the HBHA sediments are being entrained and/or transported out of the HBHA during storm events. The primary analytical objective is that measurements be representative of the actual site conditions and that data resulting from field sampling and analysis activities be comparable.



Mr. Larry McTiernan 18 May 2001 Page 3

Sample results for metals were qualified as the result of measurement error, which includes both analytical (laboratory) error and sampling (field) error. Measurement error associated with analysis includes unacceptable recoveries for lead in the interference check sample and laboratory blank contamination. There was one major impact on data usability.

• Results for aluminum in both samples were qualified as less than the reported values based on laboratory blank contamination.

Measurement error associated with sample collection includes field blank contamination. The following major impacts on data usability were noted:

- Results for calcium, copper, and magnesium in both samples were qualified as less than the reported values based on field blank contamination.
- The result for barium in SW-09 was qualified as less than the reported value based on field blank contamination.

Total Suspended Solids (TSS)

All quality control criteria were met for the TSS analyses of these samples.

Data Completeness

No raw data were included in the data package. This is inconsistent with Region I guidelines, which specify that full Tier III deliverables are to be provided for all data packages no matter what level of validation is to be performed. However, the lack of raw data is acceptable to the client and does not adversely affect the Tier II validation effort. Therefore, no further action was taken on this basis.

No documentation of sample pHs was provided in the data package. At the request of the validator, the laboratory provided a copy of their Preservative Record, dated 10/11/00, via facsimile on 5/17/01. This document confirmed that all samples were properly preserved, and was inserted into the data package by the validator to ensure that accurate and complete documentation is available for future reference.

Blanks

The following analytes were detected in associated blanks.



Mr. Larry McTiernan 18 May 2001 Page 4

Analyte	Type of Blank	Maximum Concentration	Action Level	Action
Aluminum	Calibration	23.1 μg/L	115.5 μg/L	U
Antimony	Calibration	5.3 μg/L	26.5 μg/L	None
Barium	Field	5.6 μg/L	28.0 μg/L	U
Calcium	Field	14,500 μg/L	72,500 μg/L	U
Copper	Field	1.4 μg/L	7.0 μg/L	U
Iron	Field	84.4 μg/L	422 μg/L	None
Magnesium	Field	1650 μg/L	8250 μg/L	U
Manganese	Field	8.5 μg/L	42.5 μg/L	None
Potassium	Field	369 μg/L	1845 μg/L	None
Sodium	Field	1220 μg/L	6100 μg/L	None
Thallium	Calibration	6.5 μg/L	32.5 μg/L	None
Zinc	Field	7.9 μg/L	39.5 μg/L	None

Antimony and thallium were not detected in either site sample, therefore no sample results were affected by the associated blank contamination.

Iron, manganese, potassium, sodium, and zinc were present in both samples at concentrations exceeding the action limit for each analyte; therefore, no qualifiers were warranted for these elements based on blank contamination. The result for barium in SW-04 was also present at a concentration exceeding the action limit and was therefore not qualified based on blank contamination.

Results for aluminum, calcium, copper, and magnesium in SW-04 and SW-09 were qualified as less than the reported values (U) based on blank contamination.

The result for barium in SW-09 was qualified as less than the reported value (U) based on blank contamination.

ICP Interference Check Sample

Interference check sample results for lead (76.6% and 72.1%) did not meet the acceptance criterion (80-120% Recovery). Results for lead in SW-04 and SW-09 were qualified as estimated (UJ) on this basis.



Mr. Larry McTiernan 18 May 2001 Page 5

Sample Quantitation

The result for cadmium in SW-04 and for chromium in SW-09 were qualified as estimated (J) because they are less than twice the applicable instrument detection limit. All "B" flags applied by the laboratory to sample results below the applicable CRDL were removed.

Please contact the undersigned at (865) 966-8880 if you have any questions or need further information.

Very truly yours,

TRILLIUM, INC.

Carol A. Erikson

Quality Assessment Manager

Carol a Erikson

CAE/das

Attachments: Table I: Recommendation Summary

Table II: Overall Evaluation of Data

Data Summary Key Data Summary Tables

Data Validation (DV) Worksheets

\Roux SedTransport\2279in.wpd



TABLE I

INDUSTRI-PLEX SITE

STL Connecticut Report #7000-2279A

Recommendation Summary

Sample Nos.	Matrix	Total TAL Metals	Dissolved Arsenic	TSS
SW-04	AQ	$A^{1}, J^{1,2}$	A	A
SW-09	AQ	$A^{1,2}, J^{1,3}$	A	Α

AQ - aqueous

NA - not applicable

- A = Accept the results for the sample.
- A¹ = Accept the results for the sample, but qualify the positive results for aluminum, calcium, copper, and magnesium as not detected (U) due to blank contamination.
- A² = Accept the results for the sample, but qualify the positive result for barium as not detected (U) due to blank contamination.
- J^1 = Estimate (UJ) the result for lead due to unacceptable interference check sample results.
- J² = Estimate (J) the result for cadmium because it is less than twice the applicable instrument detection limit.
- J³ = Estimate (J) the result for chromium because it is less than twice the applicable instrument detection limit.

TABLE II

INDUSTRI-PLEX SITE STL REPORT #7000-2279A Overall Evaluation of Data

	Total TAL Metals,	Selected TAL Metals, Di	ssolved Arsenic, and	l Total Suspende	d Solids
DQOs (list all DQOs)	Sampling and/or Analytical Method Appropriate Yes or No	Measurement Error		Sampling Variability**	Potential Usability Issues
		Analytical Error	Sampling Error*		
The DQO for this site is to collect data of sufficient quality to: 1. Allow a technically sound evaluation of sediment fate and transport, as well as impacts to surface water, in the Hall's Brook Holding Area (HBHA), located just downstream of the Industri-Plex site. 2. Determine if the HBHA sediments are being entrained and/or transported out of the HBHA during storm events. 3. Be representative of the actual site conditions and comparable to other data generated in support of this project.	Analytical Method: Yes SW-846 Methods 6010B (metals), 7471A (mercury) and 160.2 (TSS) Sampling Method: Yes Grab	Refer to qualifications in Table I A ¹ J ^{1,2,3}	Refer to qualifications in Table I A ^{1,2}		 Results for aluminum calcium, copper, and magnesium in both samples were qualified as less than the reported values due to field and/or laboratory blank contamination. The result for barium in SW-09 was qualified as less than the reported value due to blank contamination. The result for lead was estimated due to unacceptable interference check sample results. Results for cadmium in SW-04 and for chromium in SW-09 were estimated because they were less than 2xIDL.

- * The evaluation of "sampling error" cannot be completely assessed in data validation.
- ** Sampling variability is not assessed in data validation.



DATA SUMMARY KEY INORGANIC DATA VALIDATION

- J = The associated value is an estimated quantity.
- R = The data are unusable. (Note: Analyte may or may not be present).
- U = The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.
- UJ = The material was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

DATA SUMMARY FORM: TOTAL TAL METALS WATER SAMPLES (ug/L)

Site Name: Industri-Plex

STL Report No. 7000-2279A

ĺ	Sample Number	SW-04	SW-09	
ĺ	Lab ID	002279A-05	002279A-10	
Ì	Date Sampled	09-Oct-00	09-Oct-00	
CRDL				
200	Aluminum	31.3 U	55.9 U	
60	Antimony	5.0 U	5.0 U	
10	Arsenic	10.0	9.3	
200	Barium	29.8	25.5 U	
5	Beryllium	0.50 U	0.50 U	
5	Cadmium	0.68 J	0.50 U	
5000	Calcium	42900 U	35300 U	
10	Chromium	1.0 U	1.7 J	
50	Cobalt	1.0 U	1.0 U	
25	Copper	6.1 U	6.7 U	
100	Iron	800	1140	
3	Lead	2.0 U	I 2.0 UJ	J
5000	Magnesium	6330 U	5290 U	
15	Manganese	330	266	
0.2	Mercury	0.10 U	0.10 U	
40	Nickel	1.5 U	1.5 U	
5000	Potassium	7670	6500	
5	Selenium	5.0 U	5.0 U	
10	Silver	1.0 U	1.0 U	
5000	Sodium	41300	36000	
10	Thallium	6.0 U	6.0 U	
50	Vanadium	1.0 U		
20	Zinc	230	182	

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DATA SUMMARY FORM: SELECTED DISSOLVED METAL WATER SAMPLES

(ug/L)

Site Name: Industri-Plex

STL Report No. 7000-2279A

	Sample Number	SW-04	SW-09							<u> </u>	
	Lab ID	002279A-05	002279A-10		<u> </u>			<u></u>			
	Date Sampled	09-Oct-00	09-Oct-00		 					∯ -	_
					 					ļ — <u>-</u>	
CRDL		ļ								1	
10	Arsenic	2.5 U	2.5 U								
					 					 	
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DATA SUMMARY FORM: TOTAL SUSPENDED SOLIDS WATER SAMPLES (mg/L)

Site Name: Industri-Plex

STL Report No. 7000-2279A

Sample Number	SW-04	SW-09				1			
Lab ID	002279-5	002279-10]						
Date Sampled	09-Oct-00	09-Oct-00							
						-		 	-
					<u> </u>	-		 	
CRDL		ļ			ļ	- <u> </u>	<u> </u>	 	
5.0 TSS	5.0 U	5.0							
			į			*** ***	:		
				- 1	-	1 1			

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REGIO	NI	
Data	Review	Worksheets

Site Name	Industri-Plex
Reference	Number

REGION I REVIEW OF INORGANIC CONTRACT LABORATORY DATA PACKAGE

Trillium Inc. The hardcopied (laboratory name) STL Cat Region I has been reviewed and the data summarized. The data review incl	onulchicut data package received quality assurance and performance uded:
Case No. 7000-2279A SAS No. SDG. No. of Samples II	Sampling Date(s) 10/9/50 Shipping Date(s) 10/10/00 Date Rec'd by Lab 10/11/00
Traffic Report Nos: SW-01, SW-10 SW-06, SW-07, SW-08, Trip Blank No.: Field Plank Field Dup Nos: SW-01/SW-10 EPA-40108/7470A, 140.2 SOW No. requires that specific associated reports be provided by the LV, and SMO. The general criteria used based on an examination of:	analytical work be done and that laboratory to the Regions, EMSL-
-Data Completeness -Holding Times -Calibrations -Blanks -ICP Interference Check Results -Matrix Spike Recoveries -Laboratory Duplicates Overall Comments: TierI Validation	-Sample Quantitation
Definitions and Qualifiers:	
 A - Acceptable data. J - Approximate data due to quality R - Reject data due to quality contr U - Analyte not detected. 	control criteria. ol criteria.
Reviewer: <u>Carriksor</u>	Date: 5/17/01 CA45/18/01

REGION I Data Review Worksheets

I. DATA COMPLETENESS

MISSING INFORMATION	DATE LAB CONTACTED	DATE REC'D
raw data	OK, per client - ne	action_
sample pHs	5/14/01 -5/17/01-	5/17/01
		

REGION I . Data Review Worksheets

Complete table for all samples and pircle the II. HOLDING TIMES analysis date for samples not within criteria.

SAMPLE ID	DATE SAMPLED	HG DATE ANALYSIS	CYANIDE DATE ANALYSIS	others Date Analysis	рĦ	ACTION
3W-04 SW-09	10/4/00	Prep-10/16 <u>Run-10/17</u> Prep-10/14 <u>Run-10/17</u>		Prep - 10/24 Bun-10/25 Prep-10/24 Pun-10/25	42	None
			!			,.

METALS - 180 DAYS FROM SAMPLE COLLECTION MERCURY - 28 DAYS FROM SAMPLE COLLECTION CYANIDE - 14 DAYS FROM SAMPLE COLLECTION

ACTION:

- If holding times are exceeded all positive results are ı. estimated (J) and non-detects are estimated (UJ).
- If holding times are grossly exceeded, the reviewer may 2. determine that non-detects are unusable (R).

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IV A. BLANK ANALYSIS RESULTS (Sections 1-3)

List the blank contamination in Sections 1 & 2 below. A separate worksheet should be used for soil and water blanks.

#OI KAIL	eet should be t		nd sect Dienke	7 •
1. Lai	boratory Blanks	3		hatrix: AQ
DATE	ICB/CCB#	PREP BL	ANALYTE	CONC /UNITS
0/2 <u>5/00</u>	CCBI		<u> 41 </u>	14.1 Mg/L
	ecb2		Mg	10.2 Mg/L
	<u> </u>		(3b)	5.3 uglL
	CCB 3		AI	10.2 uglL
	ccB4		(T)	6.5 ugll
	cc <i>b'5</i> cc <i>b</i> 6	=	AS	12.8 mg/L -2.8 mg/L
2. Eq	1.1	Blanks —	Mg	10.1 Mg/L
DATE	EQUIP BL	± b	NALYTE	CONC. /UNITS
10/9/00	Freid Blas	<u>k</u>	-1	20.9 Mg/L
			3a	5.6 mg/L
		_	Ca	14500 ugll
		_	Cu	1.4 ugil
			Fe	84, 4 mg/L Na 1220,
3. Fr	↓ equency Require	<u></u>	M g Mn	1450 Mg/L 7.9 Mg/
		(K	369 Hall.
A.	Was a prepar for every 20 batch?	ration blank an D samples and f	alyzed for each or each digesti	T matrix,
В.	Was a calib every 2 hour	ration blank rurs whichever is	n every 10 sam more frequent:	ples or Yes or No

If No,

The data may be affected. Use professional judgement to determine the severity of the effect and qualify the data accordingly. Discuss any actions below, and list the samples affected.

TO SPHI

REGION I Data Review Worksheets

IV B. BLANK ANALYSIS RESULTS (Section 4)

4. Blank Actions

The Action Levels for any analyte is equal to five times the highest concentration of that element's contamination in any blank. The action level for samples which have been concentrated or diluted should be multiplied by the concentration/dilution factor. No positive sample result should be reported unless the concentration of the analyte in the sample exceeds the Action Level (AL). Specific actions are as follows:

- When the concentration is greater than the IDL, but less than the Action Level, report the sample concentration detected with a U.
- 2. When the sample concentration is greater than the Action Level, report the sample concentration unqualified.

MATRIX:_	<u> </u>			MATRIX: /	10
ELEMENT	MAX, CONC.	AL/ UNITS	ELEMENT	MAX, CONC./ UNITS	AL/ Units
Al	23.1 µg/L	115.5 Mg/L	Iron	84.4 Mg/L	422 Mg/L
Mg	1450 ugil	8250 Mg/L	Mn	8.5 Mg/L	42.5 Mg/L.
<u>5b</u>	5.3 ugil	26.5 ug/L	<u>K</u>	349 ug/L	1845 ug 1 L
Th	6.5 ugil	32.5 Mg/L	Na	1220 Mg/L	6100 ug/L
Ba	5.6 mg/L	28.0 ug/	Zn	7.9 ug/L	39,5 ug/L
<u>Ca</u>	14,500 ugil	72,500,491L	<u>A5</u>	-2.8 Mg/1	(no action)
<u>Cu</u>	1.4 ugil	7.0 Mg/L			

NOTE: Blanks analyzed during a soil case must be converted to mg/kg in order to compare them with the sample results.

Conc. in ug/L X Volume diluted to (200ml) X 1L X 1000mm X 1mg = mg/kg Weight digested (1gram) 1000ml 1kg 1000ug

Multiplying this result by 5 to arrive at the action level gives a final result in mg/kg which can then be compared to sample results.

REGIO			
Data	Re	view	Worksheets

V A. ICP INTERFERENCE CHECK SAMPLE (Sections 1 & 2)

1. Recovery Criteria

List any elements in the ICS AB solution which did not meet the criteria for \$8.

DATE	ELEMENT	\$R	ACTION	SAMPLES AFFECTED
10/25/00	Pb 7	76.62	<u>uJ</u>	<u>5W-04, 5W-09</u>
		$\left\langle \frac{72.1}{2} \right\rangle$	<u> 43</u>	
				<u> </u>
				•
		···		

ACTIONS:

If an element does not meet the &R criteria, follow the actions stated below:

		PERCENT RECO	VERY
•	<50%	50-79%	>120\$
Fositive Sample Results	R	J	J
Non-detected Sample Results	Ŕ	បវ	A

2. Frequency Requirements

Were Interference QC samples run at the beginning and end of each sample analysis run or a minimum of twice per 8 hour working shift, whichever is more frequent?



If no,

The data may be affected. Use professional judgement to determine the severity of the effect and qualify the data accordingly. Discuss any actions below and list the samples affected.



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May 15, 2001

Mr. Larry McTiernan Roux Associates, Inc. 25 Corporate Drive Suite 230 Burlington, MA 01803

Subject:

STL Connecticut Report No. 7000-2279A

Downgradient Transport (Surface Water and Sediments) Investigation

Industri-Plex Site Woburn, Massachusetts

SVOCs:

10/Surface Waters/SW-01, SW-10, SW-02, SW-03, SW-04, SW-

05, SW-06, SW-07, SW-08, SW-09 (Field Duplicates: SW-01/SW-10)

1/Field Blank

Dear Mr. McTiernan:

A Tier II validation was performed on the organic analytical data for two surface water samples collected by Roux Associates, Inc. at the Industri-Plex Site in Woburn, Massachusetts and reported in the above-referenced laboratory report. Several additional samples were also reported in this data package, but, per project specifications, only the results for SW-04 and SW-09 were validated. All of the samples were analyzed according to EPA Method 8270C for semivolatile organic compounds (SVOCs). For SW-04 and SW-09, the full TCL (target compound list, per the Contract Laboratory Program), with cyclohexanone added as a target analyte, was reported.

The data were evaluated as Tier II level in accordance with the "Region I EPA NE Data Validation Functional Guidelines for Evaluating Environmental Analyses" dated December 1996, and the project-specific Quality Assurance Project Plan (QAPP), dated September 14, 1999. The evaluation was based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues.
- Data Completeness.
- Preservation and Technical Holding Times.
- NA Gas Chromatography/Electron Capture Detector (GC/ECD) Instrument Performance Checks.
 - Initial and Continuing Calibration.

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Mr. Larry McTiernan 15 May 2001 Page 2

- Blanks.
- Surrogate Compounds.
- Internal Standards.
- Matrix Spike (MS)/Matrix Spike Duplicates (MSD).
- * Field Duplicates.
 - Sensitivity Check (Method Detection Limit Study or Laboratory Fortified Blank).
- NA PE Samples/Accuracy Check.
- NA Target Compound Identification.
- NA Sample Quantitation and Reported Quantitation Limits.
- NA SVOC and Pesticides Cleanup.
- NA System Performance.
- * = All criteria were met for this parameter.
- NA = Not Applicable.

Note: Worksheets for QC parameters that met criteria or are not applicable to the method will not be included as attachments to this document.

Table I summarizes the validation recommendations which were based on the following information. Table II summarizes the overall evaluation of the data with reference to the data quality objectives (DQOs) and potential usability issues.

Overall Evaluation of Data and Potential Usability Issues

The DQO for this site is to collect data of sufficient quality to allow a technically sound evaluation of sediment fate and transport, as well as impacts to surface water, in the Hall's Brook Holding Area (HBHA), located just downstream of the Industri-Plex site. The primary intended use for the data is to determine if the HBHA sediments are being entrained and/or transported out of the HBHA during storm events. The primary analytical objective is that measurements be representative of the actual site conditions and that data resulting from field sampling and analysis activities be comparable.

SVOC sample results were qualified as the result of measurement error, which in this case includes only analytical (laboratory) error. Measurement error associated with sample analysis includes calibration variability and poor LFB performance. There was one major impact on data usability:

• The result for pentachlorophenol in SW-04 was rejected because this compound was not recovered in the laboratory fortified blank analysis.



Mr. Larry McTiernan 15 May 2001 Page 3

Data Completeness

No raw data were included in the data package. This is inconsistent with Region I guidelines, which specify that full Tier III deliverables are to be provided for all data packages no matter what level of validation is to be performed. However, the lack of raw data is acceptable to the client and does not adversely affect the Tier II validation effort. Therefore, no further action was taken on this basis.

Calibration

Compounds that did not meet criteria in the continuing calibrations are summarized below:

Instrument ID:	HP5972S	Actio	n	A CC
Compound	CC 10/23/00 @12:21	Positive Detects	NDs	Affected Samples
benzyl alcohol	49.4 %D	NA	UJ	SW-04

Sample results will be qualified as indicated in the above table.

Laboratory Fortified Blank

Recovery of 2,4-dinitrophenol (55%) was unacceptably low (QC 70-139%) in the laboratory fortified blank analysis. Results for 2,4-dinitrophenol in SW-04 and SW-09 were qualified as estimated (UJ) on this basis.

Although acceptance limits of 0-25% were designated by the laboratory on the summary form in the data package, acceptable recovery was not demonstrated for benzoic acid in the laboratory fortified blank analysis associated with these samples, based on the validator's professional judgment (11%). Results for benzoic acid in SW-04 and SW-09 were qualified as estimated (UJ) on this basis.

Pentachlorophenol (at $40 \mu g/L$) was not recovered (0%) in the laboratory fortified blank. However, SW-09 was also prepared and analyzed as a matrix spike/matrix spike duplicate pair. The MS/MSD spiking solution includes pentachlorophenol (at $100 \mu g/L$), and very good recoveries (83% and 77%) were obtained for this compound in the spiked analyses of SW-09. SW-09 and SW-04 were analyzed on different dates; the MS/MSD pair was run on the same date as SW-09 and the laboratory fortified blank was run in the same analysis series as SW-04. Therefore, based on professional judgment, the result for pentachlorophenol in SW-04 was rejected (R) as unreliable due to the lack of recovery in the laboratory fortified blank. The result for pentachlorophenol in SW-09 was qualified as estimated



Mr. Larry McTiernan 15 May 2001 Page 4

(UJ), rather than being rejected, based on the acceptable recoveries of pentachlorophenol in the spiked analyses of this sample, which mitigate the lack of recovery for this analyte in the laboratory fortified blank.

The laboratory, however, should investigate the poor laboratory fortified blank recoveries and implement appropriate corrective action. Poor recoveries in a blank spike analysis are indicative of a potentially serious problem in the analytical process.

Please contact the undersigned at (865) 966-8880 if you have any questions or need further information.

Very truly yours,

TRILLIUM, INC.

Carol A. Erikson

Quality Assessment Manager

Carala Erikson

CAE/ekd

Attachments: Table I: Recommendation Summary

Table II: Overall Evaluation of Data

Data Summary Key

Data Validation (DV) Worksheet

Data Summary Table

C:\AllTrillium\Roux SedTransport\2279SV

TABLE I

INDUSTRI-PLEX SITE

STL Connecticut Report #7000-2279A

Recommendation Summary

Sample Nos.	Matrix	TCL SVOCs	
SW-04	AQ	$J^{1,2}, R^1$	
SW-09	AQ	$J^{2,3}$	

AQ - aqueous

- A = Accept the results for the sample.
- J^{1} = Estimate (UJ) result for benzyl alcohol due to a high %D in the continuing calibration.
- J^2 = Estimate (UJ) the results for 2,4-dinitrophenol and benzoic acid due to poor recoveries in the laboratory fortified blank.
- J³ = Estimate (UJ) the result for pentachlorophenol due to no recovery in the laboratory fortified blank but acceptable recoveries in the matrix spikes using this sample.
- R^1 = Reject (R) result for pentachlorophenol due to no recovery in the laboratory fortified blank.

TABLE II

INDUSTRI-PLEX SITE STL REPORT #7000-2279A Overall Evaluation of Data

Semivolatile Organic Compounds (SVOCs)									
DQOs (list all DQOs)	Sampling and/or Analytical Method Appropriate Yes or No	Measurement Error		Measurement Error		Measurement Error		Sampling Variability**	Potential Usability Issues
		Analytical Error	Sampling Error*						
The DQO for this site is to collect data of sufficient quality to: 1. Allow a technically sound evaluation of sediment fate and transport, as well as impacts to surface water, in the Hall's Brook Holding Area (HBHA), located just downstream of the Industri-Plex site. 2. Determine if the HBHA sediments are being entrained and/or transported out of the HBHA during storm events. 3. Be representative of the actual site conditions and comparable to other data generated in support of this project.	Analytical Method: Yes SW-846 Method 8270C Sampling Method: Yes Grab	Refer to qualifications in Table I J1.2.3 R1	None		 Lack of recovery of pentachlorophenol in the laboratory fortified blank analysis renders the result for this compound unusable in SW-04. Acceptable MS/MSD recoveries for this compound led to qualification of the result for pentachlorophenol in SW-09 as estimated, rather than rejected. The result for benzyl alcohol in SW-04 was estimated due to calibration variability. Results for 2,4-dinitrophenol and benzoic acid in both samples were estimated due to poor laboratory fortified blank recoveries. 				

- * The evaluation of "sampling error" cannot be completely assessed in data validation.
- ** Sampling variability is not assessed in data validation.

DATA SUMMARY KEY ORGANIC DATA VALIDATION

- J = The associated numerical value is an estimated quantity.
- R = The data are unusable (compound may or may not be present). Resampling and reanalysis are necessary for verification. The R replaces the numerical value or sample quantitation limit.
- U = The compound was analyzed for, but not detected. The associated numerical value is the sample quantitation limit or the adjusted sample quantitation limit.
- UJ = The compound was analyzed for, but not detected. The associated numerical value is the estimated sample quantitation limit.

DATA SUMMARY TABLE - TCL SEMIVOLATILE ORGANICS 1 WATER SAMPLES (ug/L)

Site Name: Industri-Plex

STL Report #7000-2279A

Sample Number	SW-04	SW-09			
Lab ID	002279A-05	002279A-10			
Dilution Factor*	1.14	1.14			
Date Sampled	09-Oct-00	09-Oct-00			
Date Extracted	16-Oct-00	16-Oct-00			
Date Analyzed	23-Oct-00	24-Oct-00			
CRQL**	<u> </u>	<u> </u>	 	<u></u>	
10 Cyclohexanone		<u></u>	i		
10 Phenol					
10 bis(2-Chloroethyl)ether					
10 2-Chlorophenol					
10 1,3-Dichlorobenzene					
10 1,4-Dichlorobenzene					
10 Benzyl alcohol	UJ				
10 1,2-Dichlorobenzene					
10 2-Methylphenol	<u> </u>			l	
10 bis(2-chloroisopropyl)ether		ļ			
10 4-Methylphenol					
10 N-Nitroso-di-n-propylamine	ļ		 		
10 Hexachloroethane					
10 Nitrobenzene	ļ <u>.</u>		 		
10 Isophorone			 		
10 2-Nitrophenol					
10 2,4-Dimethylphenol					
50 Benzoic acid	UJ	เบ			
10 bis(2-Chloroethoxy)methane			·		
10 2,4-Dichlorophenol					
10 1,2,4-Trichlorobenzene					
10 Naphthalene					

^{*} includes adjustment for use of a sample volume slightly smaller than 1000 mL

[\]Roux ScdTransport\2279SV

^{**} blank spaces mean the analyte was not detected; sample-specific CRQLs are equal to unadjusted CRQL times the DF

DATA SUMMARY TABLE - TCL SEMIVOLATILE ORGANICS 2 WATER SAMPLES (ug/L)

Site Name: Industri-Plex

STL Report #7000-2279A

Sample Number	SW-04	SW-09		,				
Lab ID	002279A-05	002279A-I			<u> </u>		1	
Dilution Factor*	1.14	1.14		1	:			
Date Sampled	09-Oct-00	09-Oct-00						
Date Extracted	16-Oct-00	16-Oct-00				-		
Date Analyzed	23-Oct-00	24-Oct-00						
CRQL**			<u> </u>	<u></u>]		
10 4-Chloroaniline								
10 Hexachlorobutadiene					!			
10 4-Chloro-3-methylphenol							1	<u> </u>
10 2-Methylnaphthalene								
10 Hexachlorocyclopentadiene							i	
10 2,4,6-Trichlorophenol								
50 2,4,5-Trichlorophenol					<u> </u>		<u>i</u>	
10 2-Chloronaphthalene							<u> </u>	
50 2-Nitroaniline								
10 Dimethylphthalate								
10 Acenaphthylene								<u> </u>
10 2,6-Dinitrotoluene							i	
50 3-Nitroaniline							<u> </u>	
10 Acenaphthene								
50 2,4-Dinitrophenol	UJ	ι						
50 4-Nitrophenol								
10 Dibenzofuran								
10 2,4-Dinitrotoluene					į			
10 Diethylphthalate								
10 4-Chlorophenyl-phenylether		,						
10 Fluorene								
50 4-Nitroaniline								

^{*} includes adjustment for use of a sample volume slightly smaller than 1000 mL

\Roux SedTransport\2279SV

^{**} blank spaces mean the analyte was not detected; sample-specific CRQLs are equal to unadjusted CRQL times the DF

DATA SUMMARY TABLE - TCL SEMIVOLATILE ORGANICS 3 WATER SAMPLES (ug/L)

Site Name: Industri-Plex

STL Report #7000-2279A

Sample Num	ber SW-04	SW-09						
Lab	·····	002279A-10						
Dilution Factor	or* 1.14	1.14		1				
Date Samp	led 09-Oct-00	09-Oct-00						
Date Extrac	ted 16-Oct-00	16-Oct-00						
Date Analyz	zed 23-Oct-00	24-Oct-00		· · · · · · · · · · · · · · · · · · ·				
CRQL++		L						<u></u> -
50 4,6-Dinitro-2-methylphenol								
10 N-Nitrosodiphenylamine					<u> </u>			
10 4-Bromophenyl-phenylether								
10 Hexachlorobenzene				<u> </u>				
50 Pentachlorophenol	R	UJ						
10 Phenanthrene					<u> </u>			
10 Anthracene		<u> </u>						
10 Di-n-butylphthalate								
10 Fluoranthene	!			!				
10 Pyrene							_	
10 Butylbenzylphthalate								
20 3,3'-Dichlorobenzidine				i		_		
10 Benzo(a)anthracene	_ !			_				
10 Chrysene				_				
10 bis(2-Ethylhexyl)phthalate				<u> </u>		<u> </u>		
10 Di-n-octylphthalate						<u> </u>		
10 Benzo(b)fluoranthene				<u> </u>				··· <u>·</u>
10 Benzo(k)fluoranthene								
10 Benzo(a)pyrene				<u>i</u>				
10 Indeno(1,2,3-cd)pyrene								
10 Dibenz(a,h)anthracene								
10 Benzo(g,h,i)perylene						_	<u> </u>	

^{*} includes adjustment for use of a sample volume slightly smaller than 1000 mL

\Roux SedTransport\2279SV

^{**} blank spaces mean the analyte was not detected; sample-specific CRQLs are equal to unadjusted CRQL times the DF

Site Name	Indust	ri-Plex
Reference l		

REGION I ORGANIC DATA VALIDATION

REGION I GROWNE DIT	AT THE DITTION
The following data package has been validated:	
Case/Project No. S SDG No. 1000 2279A No. of Samples/Matrix 10/AQ	SOW/Method No. EPA 8270C Sampling Date(s) 10/9/00 Shipping Date(s) 10/10/00 Date Rec'd by lab 10/11/00
	0, 5w-07, 5w-03, 5w-04, 5w-05, 0, 09
Trip Blank No. NA Equipment Blank No. Feld Blank Bottle Blank No. NA Field Duplicate Nos. SW-01 /SW-10 PES Nos.	
The Region I, EPA-NE Data Validation Functional Guid revision 12/96 was used to evaluate the data and Functional Guidelines were used to evaluate the data and criteria from EPA approved QAPjP or amendment to QA	d/or approved modifications to the EPA-NE are attached to this cover page: (attach modified
A Tier II or Tier III evaluation was used to validate the partial Tier III was used, then identify samples, parameter $5W-04$ and $5W-09$	data (circle one). If a Tier II validation with a ers, etc. that received partial Tier III validation
The data were evaluated based upon the following param	-
- Overall Evaluation of Data - Data Completeness (CSF Audit - Tier I) - Preservation & Technical Holding Times - GC/MS & GC/ECD Instrument Performance Check - Initial & Continuing Calibrations - Blanks - Surrogate Compounds - Internal Standards	Field Duplicates Sensitivity Check PE Samples/Accuracy Check
Region I Definitions and Qualifiers:	
A - Acceptable Data J - Numerical value associated with compound is an es R - The data are rejected as unusable. The R replaces th U - Compound not detected at that numerical sample qu UJ - The sample quantitation limit is an estimated quanti TB, BB, EB - Compound detected in aqueous trip blank blank associated with soil/sediment samples.	ne numerical value or sample quantitation limit. lantitation limit. ity.
Validator's Name Carol A-ErikSon Company Nam	ne Trillium In Ophone Number 8659668880
Date Validation Started 5/11/01	Date Validation Completed

Check if all criteria are met and no hard copy worksheet provided. Indicate NA if worksheet is not applicable to analytical method. Note: there is no standard worksheet for System Performance, however, the validator must document all system performance issues in the Data Validation Memorandum.

VOA/SV worksheets:

Pest/PC	VOA/SV-Pest/PCB VOA/SV-Pest/PCB-I VOA/SV-II VOA/SV-III VOA/SV-IV VOA/SV-Pest/PCB-V-A VOA/SV-Pest/PCB-V-B VOA-YI SV-VI VOA/SV-VII VOA/SV-Pest/PCB-VIII VOA/SV-Pest/PCB-XI VOA/SV-Pest/PCB-XI VOA/SV-Pest/PCB-XI VOA/SV-Pest/PCB-XII VOA/SV-Pest/PCB-XII VOA/SV-Pest/PCB-XIII VOA/SV-Pest/PCB-XIII VOA/SV-XV TABLE II-WORKSHEET	COMPLETE SDG FILE (CSF) AUDIT PRESERVATION AND HOLDING TIMES GC/MS INSTRUMENT PERFORMANCE CHECK (TUNING) INITIAL CALIBRATION CONTINUING CALIBRATION BLANK ANALYSIS BLANK ANALYSIS VOA SURROGATE SPIKE RECOVERIES SV SURROGATE SPIKE RECOVERIES INTERNAL STANDARD PERFORMANCE MATRIX SPIKE/MATRIX SPIKE DUPLICATE FIELD DUPLICATE PRECISION SENSITIVITY CHECK ACCURACY CHECK TARGET COMPOUND IDENTIFICATION SAMPLE QUANTITATION TENTATIVELY IDENTIFIED COMPOUNDS SEMIVOLATILE CLEANUP OVERALL EVALUATION OF DATA	
	VOA/SV-Pest/PCB	COMPLETE SDG FILE (CSF) AUDIT	NA
	VOA/SV-Past/PCB-I	PRESERVATION AND HOLDING TIMES	NV
_	Pest/PCB-IIA	GC/ECD INSTRUMENT PERFORMANCE CHECK-	
	resured-im	RESOLUTION .	1
	Pest/PCB-IIB	GC/ECD INSTRUMENT PERFORMANCE CHECK-	
	resur CD-IID	RETENTION TIMES	İ
	Pest/PCB-IIC	GC/ECD INSTRUMENT PERFORMANCE CHECK-	
	1030100-110	ACCURACY CHECK OF INITIAL CALIBRATION	1
	Pest/PCB-IID	GC/ECD INSTRUMENT PERFORMANCE CHECK-	
	100105-115	PESTICIDE DEGRADATION	1
	Pest/PCB-III	INITIAL CALIBRATION	-
	Pest/PCB-IV	CONTINUING CALIBRATION	
	VOA/SV-Pest/PCB-V-A	BLANK ANALYSIS	
	VOA/SV-Pest/PCB-V-B	BLANK ANALYSIS	
	Pest/PCB-VI	SURROGATE COMPOUNDS:	
		SPIKE RECOVERIES AND RETENTION TIME SHIFT	
	Pest/PCB-VII	PESTICIDE CLEANUP	
	VOA/SV-Pest/PCB-VIII	MATRIX SPIKE/MATRIX SPIKE DUPLICATE	
	VOA/SV-Pest/PCB-IX	FIELD DUPLICATE PRECISION	
	VOA/SV-Pest/PCB-X	SENSITIVITY CHECK	
	VOA/SV-Pest/PCB-XI	ACCURACY CHECK	
	Pest/PCB-XII	COMPOUND IDENTIFICATION	
	VOA/SV-Pest/PCB-XIII	SAMPLE QUANTITATION	
	TABLE II-WORKSHEET	OVERALL EVALUATION OF DATA	
			¥

I certify that all criteria were met for the worksheets checked above.

Signature: Aud O Eut Sor	Name: Carol A. Erikson
Date: 5/1401	

Validator: CaEukson

IV. CONTINUING CALIBRATION - List all analytes that are outside calibration criteria.

Date of ICAL	Date of CCAL	Instrument	Parameter	Matrix	Compound	%D	RRF	Samples Affected	Action
10/10/00	10/23/00	HP59725	5V	AQ	benzyl alcohol	49.4	οK	5w-04	W
									
			-						
									
Comments:		<u></u>							

12/96

List al Has ar Date o	il compounds, su	nrrogates, and DL study been alysis: Same as		ds that are outside t			of interes	st? Y N Y N Y N Y N
Matrix	Compound	MDL > QL	Method QC Limits < 80% or > 120%	IS Outside Area Count and/or RT Criteria	RSD > 20%	Samples Affec	ted	Action
		_						
ratory Has ar Does i	Fortified Blank appropriate and t contain all tare) - List all L I complete L	FB compounds, s FB been submitte Is at the method-	results to evaluate surrogates and interest at the proper free required QLs? (vendor) independer	nal standards quency?	120 Mall -		Y N Y N
ratory Has ar Does i	Fortified Blank appropriate and t contain all tare) - List all L I complete L get compound with a standar	FB compounds, so FB been submitted at the method-rd from a source of Method QC Limits	surrogates and interest at the proper free required QLs? (vendor) independed IS Outside Area Count and/or RT	nal standards quency?	120 Mall -	Can	Y N Y N N Action
Has ar Does i Was th	Fortified Blank appropriate and t contain all targ he LFB spiked w) - List all L I complete L get compound with a standar	FB compounds, s FB been submitted ds at the method- d from a source	surrogates and interest at the proper free required QLs? (vendor) independents	nal standards quency?	oration standard?	Can	
Has ar Does i Was th	Fortified Blank n appropriate and it contain all targ ne LFB spiked w Compou) - List all L I complete L get compound with a standar	FB compounds, so FB been submitted at the method-rd from a source of Method QC Limits < 60% or > 140% Other:	surrogates and interest at the proper free required QLs? (vendor) independed IS Outside Area Count and/or RT	nal standards quency? A 40/ nt of the calib	oration standard?	Can	Action A.J. A.: P.
Has ar Does i Was th	Fortified Blank n appropriate and it contain all targ ne LFB spiked w Compou) - List all L d complete L get compound with a standar	FB compounds, so FB been submitted at the method-of from a source of Method QC Limits < 60% or > 140% of ther:	surrogates and interest at the proper free required QLs? (vendor) independed IS Outside Area Count and/or RT	nal standards quency? A 4-0/ nt of the calib Samp	oration standard?	Can 1 5w-04 5w-04	Action J

Fall Storm 2



356 FARRAGUT CROSSING DR. KNOXVILLE, TN 37922

(423) 966-8880 FAX (423) 966-8885 cerikson@trilliuminc.com

May 18, 2001

Mr. Larry McTiernan Roux Associates, Inc. 25 Corporate Drive Suite 230 Burlington, MA 01803

Subject:

STL Connecticut Report No. 7000-2381A

Downgradient Transport (Surface Water and Sediments) Investigation

Industri-Plex Site

Woburn, Massachusetts

Total TAL Metals: 2

2/Surface Waters/SW-04, SW-09

1/Field Blank

Selected Total Metals:

8/Surface Water/SW-01, SW-02, SW-03, SW-05,

SW-06, SW-07, SW-08, SW-10

(Field Duplicates: SW-01/SW-10)

Dissolved Arsenic:

10/Surface Waters/SW-01, SW-02, SW-03, SW-04, SW-

05, SW-06, SW-07, SW-08, SW-09, SW-10

(Field Duplicates: SW-01/SW-10)

1/Field Blank

Total Suspended Solids:

10/Surface Waters/SW-01, SW-02, SW-03, SW-

04, SW-05, SW-06, SW-07, SW-08, SW-09, SW-

10

(Field Duplicates: SW-01/SW-10)

1/Field Blank

Dear Mr. McTiernan:

A Tier II validation was performed on the inorganic analytical data for two surface water samples collected by Roux Associates, Inc. at the Industri-Plex Site in Woburn, Massachusetts. Several additional samples were also reported in this data package, but, per project specifications, only the results for SW-04 and SW-09 were validated. The samples were analyzed according to EPA Methods 6010B/7470A, as applicable, for metals and EPA Method 160.2 for TSS. For SW-04 and SW-09, the full TAL (target analyte list, per the Contract Laboratory Program) was reported for the total metals fraction and arsenic only was reported for the dissolved fraction.



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Mr. Larry McTiernan 18 May 2001 Page 2

The data were evaluated as Tier II level in accordance with the "Region I Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses" dated June 13, 1988, and the project-specific Quality Assurance Project Plan (QAPP). The evaluation was based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues.
- Data Completeness.
- * Preservation and Technical Holding Times.
- * Instrument Calibration.
 - Contract Required Detection Limit (CRDL) Standards.
 - Blanks.
- Inductively Coupled Plasma (ICP) Interference Check Samples.
 - Matrix Spike (MS).
- Laboratory Duplicates.
- * Field Duplicates.
- * Laboratory Control Sample.
- * ICP Serial Dilution Analysis.
- * Detection Limit Results.
- NA PE Samples/Accuracy Check.
 - Sample Quantitation
- * = All criteria were met for this parameter.
- NA = Not Applicable.

Note: Worksheets for QC parameters that met criteria or are not applicable to the method will not be included as attachments to this document.

Table I summarizes the validation recommendations which were based on the following information. Table II summarizes the overall evaluation of the data with reference to the data quality objectives (DQOs) and potential usability issues.

Overall Evaluation of Data and Potential Usability Issues

Metals

The DQO for this site is to collect data of sufficient quality to allow a technically sound evaluation of sediment fate and transport, as well as impacts to surface water, in the Hall's Brook Holding Area (HBHA), located just downstream of the Industri-Plex site. The primary intended use for the data is to determine if the HBHA sediments are being entrained and/or transported out of the HBHA during



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storm events. The primary analytical objective is that measurements be representative of the actual site conditions and that data resulting from field sampling and analysis activities be comparable.

Sample results for metals were qualified as the result of measurement error, which includes both analytical (laboratory) error and sampling (field) error. Measurement error associated with analysis includes unacceptable CRDL standard recoveries for thallium and lead and laboratory blank contamination. There was one major impact on data usability.

 Results for lead in both samples qualified as less than the reported values based on laboratory blank contamination.

Measurement error associated with sample collection includes field blank contamination. There was one major impact on data usability:

 Results for aluminum, barium, calcium, chromium, copper, magnesium, and nickel in both samples were qualified as less than the reported values based on field blank contamination.

Total Suspended Solids (TSS)

All quality control criteria were met for the TSS analyses of these samples...

Data Completeness

No raw data were included in the data package. This is inconsistent with Region I guidelines, which specify that full Tier III deliverables are to be provided for all data packages no matter what level of validation is to be performed. However, the lack of raw data is acceptable to the client and does not adversely affect the Tier II validation effort. Therefore, no further action was taken on this basis.

No documentation of sample pHs was provided in the data package. At the request of the validator, the laboratory provided a copy of their Preservative Record, dated 10/23/00, via facsimile on 5/17/01. This document confirmed that all samples for metals analysis were properly preserved, and was inserted into the data package by the validator to ensure that accurate and complete documentation is available for future reference.

CRDL Standards

The following analytes did not meet recovery criteria in the CRDL standard analyses:



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Analyte	%REC	Limits	Action
thallium	46.7, 59.7	80-120%	เบ
lead	151.5	80-120%	J

Results for thallium and lead in SW-04 and SW-09 were less than 3xCRDL and were qualified as indicated above based on the unacceptable CRDL standard recoveries.

No CRDL standard was run for mercury in association with these sample analyses.

Blanks

The following analytes were detected in associated blanks.

Analyte	Type of Blank	Maximum Concentration	Action Level	Action
Aluminum	Field	110 µg/L	550 μg/L	U
Antimony	Calibration	7.1 μg/L	35.5 μg/L	None
Barium	Field	7.1 μg/L	35.5 μg/L	υ
Calcium	Field	35,700 μg/L	178,500 μg/L	U
Chromium	Field	2.5 μg/L	12.5 μg/L	U
Соррег	Field	4.2 μg/L	21.0 μg/L	U
Iron	Field	110 μg/L	550 μg/L	None
Lead	Calibration	3.0 μg/L	15.0 μg/L	U
Magnesium	Field	4230 μg/L	21,150 μg/L	U
Manganese	Field	13.4 μg/L	67.0 μg/L	None
Nickel	Field	1.7 μg/L	8.5 μg/L	U
Potassium	Field	902 μg/L	4510 μg/L	None
Sodium	Field	2690 μg/L	13,450 μg/L	None
Zinc	Field	16.8 μg/L	84 .0 μg/L	None



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Antimony was not detected in either of the site samples; therefore, no qualifiers were necessary due to the blank contamination for this analyte.

Iron, manganese, potassium, sodium, and zinc were present in both samples at concentrations exceeding the action limit for each analyte; therefore, no qualifiers were warranted for these elements based on blank contamination.

Results for aluminum, barium, calcium, chromium, copper, lead, magnesium, and nickel in SW-04 and SW-09 were qualified as less than the reported values (U) based on blank contamination.

Matrix Spike

The following analytes did not meet recovery criteria for surface water sample SW-09:

Analyte	%REC	Limits	Action
Selenium	125.8	75-125%	None

Selenium was not detected in either of the site samples and the spike recovery was slightly high, suggesting false positives or a high bias. Therefore, no qualifiers were applied on this basis and the "N" qualifiers applied by the laboratory were removed.

Sample Quantitation

Results for cadmium and cobalt in SW-04 were qualified as estimated (J) because they are less than twice the applicable instrument detection limit. All "B" flags applied by the laboratory to sample results below the applicable CRDL were removed.

Please contact the undersigned at (865) 966-8880 if you have any questions or need further information.

Very truly yours,

TRILLIUM, INC.

Carol A. Erikson

Quality Assessment Manager



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Attachments: Table I: Recommendation Summary

Table II: Overall Evaluation of Data

Data Summary Key Data Summary Tables

Data Validation (DV) Worksheets

\Roux SedTransport\2381in.wpd



TABLE I

INDUSTRI-PLEX SITE

STL Connecticut Report #7000-2381A

Recommendation Summary

Sample Nos.	Matrix	Total TAL Metals	Dissolved Arsenic	TSS
SW-04	AQ	$A^{1}, J^{1,2}$	A	А
SW-09	AQ	A^{1} , J^{1}	A	Α

AQ - aqueous

- A = Accept the results for the sample.
- A¹ = Accept the results for the sample, but qualify the positive results for aluminum, barium, calcium, chromium, copper, lead, magnesium, and nickel as not detected (U) due to blank contamination.
- J¹ = Estimate (UJ) the results for lead and thallium due to unacceptable CRDL standard recoveries.
- $J^2 =$ Estimate (J) the results for cadmium and cobalt because they are less than twice the applicable instrument detection limits.

TABLE II

INDUSTRI-PLEX SITE STL REPORT #7000-2381A Overall Evaluation of Data

Total TAL Metals, Selected TAL Metals, Dissolved Arsenic, and Total Suspended Solids								
DQOs (list all DQOs)	Sampling and/or Analytical Method Appropriate Yes or No	Measurement Error		Measurement Error		Sampling Variability**	Potential Usability Issues	
		Analytical Error	Sampling Error*					
The DQO for this site is to collect data of sufficient quality to: 1. Allow a technically sound evaluation of sediment fate and transport, as well as impacts to surface water, in the Hall's Brook Holding Area (HBHA), located just downstream of the Industri-Plex site. 2. Determine if the HBHA sediments are being entrained and/or transported out of the HBHA during storm events. 3. Be representative of the actual site conditions and comparable to other data generated in support of this project.	Analytical Method: Yes SW-846 Methods 6010B (metals), 7471A (mercury) and 160.2 (TSS) Sampling Method: Yes Grab	Refer to qualifications in Table I A ¹ J ^{1,2}	Refer to qualifications in Table I A ¹		1. Results for aluminum, barium, calcium, chromium, copper, lead, magnesium, and nickel in both samples were qualified as less than the reported values due to blank contamination. 2. Results for lead and thallium in both samples were estimated due to unacceptable CRDL standard recoveries. 3. Results for cadmium and cobalt in SW-04 were estimated because they were less than 2xIDL.			

- * The evaluation of "sampling error" cannot be completely assessed in data validation.
- ** Sampling variability is not assessed in data validation.



DATA SUMMARY KEY INORGANIC DATA VALIDATION

- J = The associated value is an estimated quantity.
 R = The data are unusable. (Note: Analyte may or may not be present).
 U = The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.
 UJ = The material was analyzed for, but was not detected. The associated value is an
- estimate and may be inaccurate or imprecise.

DATA SUMMARY FORM: TOTAL TAL METALS WATER SAMPLES (ug/L)

Site Name: Industri-Plex

STL Report No. 7000-2381A

	Sample Number	SW-04	SW-C	9		,											
	Lab ID	002381A-0-	4 002381	\-09													1
[Date Sampled	20-Oct-00	20 - Oct	-00										<u> </u>			
CRDL				<u>.</u>		l 						-]	Ĺ			
200	Aluminum	71.0 U	181	U					! !								
60	Antimony	5.0 U	5.0	U			•		<u>.</u>		į		!	<u></u>			
10	Arsenic	30.5	19.4] []		·		. :		- ;			<u> </u>	<u> </u>		
200	Barium	27.5 U	25.7	U_	<u> </u>	l			<u> !</u> ,					L	<u> </u>		
5	Beryllium	0.50 U	0.50	U		i			<u> </u>		:				<u> </u>		
5	Cadmium	0.70 J	0.50	U		 	;								11		41
5000	Calcium	37900 U	33600	U					· :						1		_!
10	Chromium	1.7 U	4.2	U										<u> </u>	<u> </u>		
50	Cobalt	1.5 J	1.0	U			-:		! i					<u> </u>	<u>i</u>		
25	Copper	10.7 U	10.7	U	1!				ļ <u>.</u>								
100	Iron	2520	1900						ii.		_ :				<u> </u>		
3	Lead	3.4 U	J 3.1	ប្ប		<u> </u>						!		ļ	· · · · · · · · · · · · · · · · · · ·		
5000	Magnesium	5530 U	5090	U			! : !- :-		1					· !			
15	Manganese	359	266	i	1				;					: 			
0.2	Mercury	0.10 U	0.10	U			i i - +-							ļ	·		
40	Nickel	2.1 U	3.0	U											÷~ - ·		
5000	Potassium	6760	6320	·						:		<u></u>			,		
5	Selenium	5.0 U	5.0	U	<u>.</u>	ļ <u></u>				:		-			<i>i</i> 1	 -	i • ·- ·-
10	Silver	1.0 U	1.0	U _	<u> </u>	· •			:						- !		
5000	Sodium	39600	31800	1	! !	' !					~	—.			1		
10	Thallium	6.0 U	J 6.0	UJ	1	i i							:		+ - !		
50	Vanadium	1.0 U	1.0	U_	ļ				1_			. —			i	· · · · · · · · · · · · · · · · · ·	_
20	Zinc	225	198	ļ	ļ					(-	i			ļ	; _1		
				<u> </u>					!		;				·		i
		<u> </u>	<u> </u>		i		<u> </u>			!				l <u>.</u>	1		

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DATA SUMMARY FORM: SELECTED DISSOLVED METAL WATER SAMPLES (ug/L)

Site Name: Industri-Plex STL Report No. 7000-2381A

Deter-				منافع والتي <u>منافع والمنافعة والمنافعة والمنافعة والمنافعة والمنافعة والمنافعة والمنافعة والمنافعة والمنافعة والمنا</u>	
	Sample Number	SW-04	SW-09		
	Lab ID	002381A-04	002381A-09		
1	Date Sampled	20-Oct-00	20-Oct-00		
			<u> </u>		
CRDL		<u> </u>	<u> </u>	<u> </u>	
10	Arsenic	10.8	10.8		
			7		
			1		
			· · · · · · · · · · · · · · · · · · ·		

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DATA SUMMARY FORM: TOTAL SUSPENDED SOLIDS WATER SAMPLES (mg/L)

Site Name: Industri-Plex

STL Report No. 7000-2381A

	Sample Number Lab ID Date Sampled	SW-04 002381A-04 20-Oct-00	SW-09 002381A-09						
CRDL									
5.0	TSS	7.5	5.0 U	<u> </u>					1
ļ ,		ļ				<u>;</u>	· · · · · · · · · · · · · · · · · · ·		<u> </u>
	· ·· ···	·			:	<u>.</u>			
\				•	:		· - ·		· · · · · · · · · · · · · · · · · · ·
				<u> </u>				·	1

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REGIO	N	I	
Data	Re	view	Worksheets

Site Name	Industri-Plex
Reference	Number

REGION I REVIEW OF INORGANIC CONTRACT LABORATORY DATA PACKAGE

Trillium, Inc. The hardcopied (laboratory name) 572 at Region I has been reviewed and the data summarized. The data review incl	quality assurance and performance
Case No. 7000-2381A SAS No. Matrix AQ. No. of Samples 11	Sampling Date(s) $\frac{10 19-30 00}{10 30 00}$ Shipping Date(s) $\frac{10 30 00}{10 31 00}$ Date Rec'd by Lab $\frac{10 31 00}{10 31 00}$
Traffic Report Nos: $5w-01$, $5w-02$ $5w-07$, $5w-08$, $5w-09$, $5w$ Trip Blank No.: Equipment Blank No.: Field Blank Field Dup Nos: $5w-01/5w-0$	analytical work be done and that laboratory to the Regions, EMSL-
-Data Completeness -Holding Times -Calibrations -Blanks -ICP Interference Check Results -Matrix Spike Recoveries -Laboratory Duplicates	-Field Duplicates -Lab Control Sample Results -Furnace AA Results -ICP Serial Dilution Results -Detection Limit Results -Sample Quantitation
Overall Comments: Tier I Validation-	- 3W-04 and 3W-09 only
Definitions and Qualifiers:	
 A - Acceptable data. J - Approximate data due to quality R - Reject data due to quality contr U - Analyte not detected. 	
Reviewer: <u>Ca Eriksor</u>	Date: 5/17/01 5/18/01 CAR

REGION I Data Review Worksheets

I. DATA COMPLETENESS

MISSING INFORMATION	DATE LAB CONTACTED	DATE REC'D
raw data	OK per client - ne	action
sample p4s	5/14/01	5/17/01

ZODOCHOTOT - CTYTT ZOGZ (10.77

CONTRACTORS

REGION I . Data Review Worksheets

II. HOLDING TIMES Complete table for all samples and pircle the analysis date for samples not within criteria.

- (

SAMPLE ID	DATE SAMPLED	HG Date Analysis	CYANIDE DATE ANALYSIS	others Date Analysis	На	ACTION
5W-04 5W-09	10/00/00	prep 11/1 run 11/2 prep 11/1 run 11/2		prep 11/3 sun 11/6 prep 11/3 run 11/6	イ2 イ2	None
						:

METALS - 180 DAYS FROM SAMPLE COLLECTION MERCURY - 28 DAYS FROM SAMPLE COLLECTION CYANIDE - 14 DAYS FROM SAMPLE COLLECTION

ACTION:

- 1. If holding times are exceeded all positive results are estimated (J) and non-detects are estimated (UJ).
- 2. If holding times are grossly exceeded, the reviewer may determine that non-detects are unusable (R).

F40000F0404 04 04 04 4004 100 100

TOTAL FROM THE STATE

50 70H

REGION I Data Review Worksheets

III B. INSTRUMENT CALIBRATION (Section 2)

2. A	naly	tica	1 5	equen	¢e
------	------	------	-----	-------	----

A.	Did the laboratory use the proper number of	
	standards for calibration as described in th sow?	0

Were calibrations performed at the beginning of В. each analysis?



Were calibration standards analyzed at the bec. ginning of sample analysis and at a minimum frequency of ten percent or every two hours during analysis, whichever is more frequent?



- Were the correlation coefficients for the cali-D. not doc'd yes or no bration curves for AA, Hg, and CN ≥ 0.995?
- £. Was a standard at 2xCRDL analyzed for all ICP analyses?

If No.

वत चलस्य

The data may be affected. Use professional judgement to determine the severity of the effect and qualify the data accordingly. Discuss any actions below and list the samples affected.

CRDL	Stol:	十人	46.7% 59.7%
			151.5 %

MATERIAL THAT

IV A. BLANK ANALYSIS RESULTS (Sections 1-3)

List the blank contamination in Sections 1 & 2 below. A separate worksheet should be used for soil and water blanks.

				•
1. Lab	oratory Blanks			matrix: AQ
DATE	ICB/CCB#	PREP BL	ANALYTE	CONC./UNITS
11/4/00	ICB		(<u>5b</u>	7.1 Mg/L)
	CCBI CCBI		<u>Ca</u> Tl	11,2- Mg/L
	<u>ccb3</u>		Tl	-7.7 Mg/L -6.6/19/
	CCB3		Al	- 10.8 Mall
1	CCB4		<u> </u>	
	CCB4		Fe	-10.8 Mg/L -15.1 Mg/L
2. Egu	CCB4		Pb	2.0 ug/L
	ipment/Trip Bla			Marie
DATE	EQUIP BL#	è	NALYTE	CONC. /UNITE
10/20/00	Field Blank		Al	_ 110 ug/L
			Ba	7.1 ug 1L
		یک	Ca	35,700 ug/L
		\subseteq	Cr	2.5 Mg/L)
			Cu	4.2 411
4	↓		Fe	110 Mg/L
3. Freq	quency Requiremen	nts		(contnextpg)
A.	Was a preparation for every 20 sabatch?	ion blank and fi	alyzed for each more each more each digestion	
ъ.	Was a calibrati	ion blank m	n every 10 sample	\
	cvery 2 mours w	MITCHEVET IS	more frequent?	(Yes)or No
If No.	all s	neg valu	es < /2×IDI	L/ > no action
The	data may be affo	acted H		

The data may be affected. Use professional judgement to determine the severity of the effect and qualify the data accordingly. Discuss any actions below, and list the samples affected.

10 30AY

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IV A. BLANK ANALYSIS RESULTS (Sections 1-3)

List the blank contamination in Sections 1 & 2 below. A separate worksheet should be used for soil and water blanks.

1. Lat	oratory Blank	:5		MATRIX: <u>AQ</u>
DATE	ICB/CCB#	PREP BL	ANALYTE	CONC, /UNITS
Huloo	CCB4		TI	-8.8 ug/L
<u> </u>	CCB5		Ca	12.1 Mg/L
	CCB5		Pb	3.0 Mg/L)
	PBW	PBW	Ca	10.2 ug/L
	PBW	_PBW	Ph	2.0. ug/L
				7.1

2. Equipment/Trip Blanks

DATE	EQUIP BL#	ANALYTE	CONC. /UNITS
10/20/00	Field Blank	Pb	2.9 ug/L
·		Ma	4230 ug/L
		$\frac{Mn}{}$	13.4 Mg/L
		Ni	1.7 Mg/L
		K	902 Mg/L /
		\ Na	2690 Jugil /
3. Freque	ency Requirements	Zn	16.8 Mg/L

A. Was a preparation blank analyzed for each matrix, for every 20 samples and for each digestion batch?

Yes or No

B. Was a calibration blank run every 10 samples or every 2 hours whichever is more frequent?

Yes or No

If No.

The data may be affected. Use professional judgement to determine the severity of the effect and qualify the data accordingly. Discuss any actions below, and list the samples affected.

REGION I Data Review Worksheets

VI. MATRIX SPIKE

TR # SW-09

HATRIX: AQ

1. Recovery Criteria

List the percent recoveries for analytes which did not meet the required criteria.

S - amount of spike added SSR - spikes sample result SR - sample result

Analyte	SSR	SR	s	∜ R	Action
	12.58	5.0 U	10.0	125.8	A (remove "N")

Matrix Spike Actions apply to all samples of the same matrix.

ACTIONS:

Se post spike -106.5 %

- If the sample concentration exceeds the spike concentration by a factor of 4 or more, no action is taken.
- 2. If any analyte does not meet the &R criteria follow the actions stated below:

	PE	RCENT RECOVERY	
	<30 <u>\$</u>	304-744	>1251-
Positive Sample Results	J	J	3
Non-detected Results	R	UJ	λ

- 2. Frequency Criteria
 - A. Was a matrix spike prepared at the required frequency? Yes or No

B. Was a post digestion spike analyzed for elements that did not meet required criteria for matrix spike recovery?

Yes or No

A separate worksheet should be used for each matrix spike pair.

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ACELT FUNCTORISM



356 FARRAGUT CROSSING DR. KNOXVILLE, TN 37922

(423) 966-8880 FAX (423) 966-8885 cerikson@trilliuminc.com

May 15, 2001

Mr. Larry McTiernan Roux Associates, Inc. 25 Corporate Drive Suite 230 Burlington, MA 01803

Subject:

STL Connecticut Report No. 7000-2381A

Downgradient Transport (Surface Water and Sediments) Investigation

Industri-Plex Site

Woburn, Massachusetts

SVOCs:

10/Surface Waters/SW-01, SW-02, SW-03, SW-04, SW-05, SW-

06, SW-07, SW-08, SW-09, SW-10 (Field Duplicates: SW-01/SW-10)

1/Field Blank

Dear Mr. McTiernan:

A Tier II validation was performed on the organic analytical data for two surface water samples collected by Roux Associates, Inc. at the Industri-Plex Site in Woburn, Massachusetts and reported in the above-referenced laboratory report. Several additional samples were also reported in this data package, but, per project specifications, only the results for SW-04 and SW-09 were validated. All of the samples were analyzed according to EPA Method 8270C for semivolatile organic compounds (SVOCs). For SW-04 and SW-09, the full TCL (target compound list, per the Contract Laboratory Program), with cyclohexanone added as a target analyte, was reported.

The data were evaluated as Tier II level in accordance with the "Region I EPA NE Data Validation Functional Guidelines for Evaluating Environmental Analyses" dated December 1996, and the project-specific Quality Assurance Project Plan (QAPP), dated September 14, 1999. The evaluation was based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues.
- Data Completeness.
- Preservation and Technical Holding Times.
- NA Gas Chromatography/Electron Capture Detector (GC/ECD) Instrument Performance Checks.
 - Initial and Continuing Calibration.

HOME OFFICE:

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STL Connecticut Report #7000-2381A

Mr. Larry McTiernan 15 May 2001 Page 2

- Blanks.
- Surrogate Compounds.
- Internal Standards.
- * Matrix Spike (MS)/Matrix Spike Duplicates (MSD).
- * Field Duplicates.
 - Sensitivity Check (Method Detection Limit Study or Laboratory Fortified Blank).
- NA PE Samples/Accuracy Check.
- NA Target Compound Identification.
- NA Sample Quantitation and Reported Quantitation Limits.
- NA SVOC and Pesticides Cleanup.
- NA System Performance.
- * = All criteria were met for this parameter.
- NA = Not Applicable.

Note: Worksheets for QC parameters that met criteria or are not applicable to the method will not be included as attachments to this document.

Table I summarizes the validation recommendations which were based on the following information. Table II summarizes the overall evaluation of the data with reference to the data quality objectives (DQOs) and potential usability issues.

Overall Evaluation of Data and Potential Usability Issues

The DQO for this site is to collect data of sufficient quality to allow a technically sound evaluation of sediment fate and transport, as well as impacts to surface water, in the Hall's Brook Holding Area (HBHA), located just downstream of the Industri-Plex site. The primary intended use for the data is to determine if the HBHA sediments are being entrained and/or transported out of the HBHA during storm events. The primary analytical objective is that measurements be representative of the actual site conditions and that data resulting from field sampling and analysis activities be comparable.

SVOC sample results were qualified as the result of measurement error, which in this case includes only analytical (laboratory) error. Measurement error associated with sample analysis includes calibration variability and poor LFB performance. There were two major impacts on data usability:

• The result for pentachlorophenol in SW-04 was rejected because this compound was not recovered in the laboratory fortified blank analysis.



Mr. Larry McTiernan 15 May 2001 Page 3 STL Connecticut Report #7000-2381A

• Results for benzoic acid in both samples were rejected due to no recovery in the laboratory fortified blank analysis.

Data Completeness

No raw data were included in the data package. This is inconsistent with Region I guidelines, which specify that full Tier III deliverables are to be provided for all data packages no matter what level of validation is to be performed. However, the lack of raw data is acceptable to the client and does not adversely affect the Tier II validation effort. Therefore, no further action was taken on this basis.

Calibration

Compounds that did not meet criteria in the initial and continuing calibrations are summarized in the following table.

Instrument ID:	HP5971Q	HP5971Q	Action		4.00 . 1	
Compound	IC 11/3/00	CC 11/2/00 @10:25	Positive Detects	NDs	Affected Samples	
hexachlorocyclopentadiene	30.5%RSD		NA	UJ	None (MS/MSD only)	
benzyl alcohol		27.7%D	NA	UJ	SW-04, SW-09	
benzoic acid	_	28.1%D	NA	UJ	SW-04, SW-09	
hexachlorocyclopentadicne		30.4%D	NA	UJ	SW-04, SW-09	

Sample results will be qualified as indicated above.

Blanks

The following compound was reported in the associated method and field blanks:

Compound	Blank Type	Max Conc.	Action Limit	Action
bis(2-ethylhexyl)phthalate	Field	1 μg/L	10 μg/L	None - ND
diethylphthalate	Method	0.4 μg/L	4.0 μg/L	None - ND



Mr. Larry McTiernan 15 May 2001 Page 4 STL Connecticut Report #7000-2381A

Neither target analyte found in the blanks was detected in either of the site samples. Therefore, no qualifiers were applied based on blank contamination.

Laboratory Fortified Blank

Recoveries of 2,4-dinitrophenol (35%; QC 70-139%) and 2,4,5-trichlorophenol (58%; QC 71-124%) were unacceptably low in the laboratory fortified blank analysis. Results for 2,4-dinitrophenol and 2,4,5-trichlorophenol in SW-04 and SW-09 were qualified as estimated (UJ) on this basis.

Although acceptance limits of 0-25% were designated by the laboratory on the summary form in the data package, acceptable recovery was not demonstrated for benzoic acid in the laboratory fortified blank analysis associated with these samples, based on the validator's professional judgment (0%). Results for benzoic acid in SW-04 and SW-09 were rejected (R) on this basis.

Pentachlorophenol (at 40 µg/L) was not recovered (0%) in the laboratory fortified blank (QC 63-125%). However, SW-09 was also prepared and analyzed as a matrix spike/matrix spike duplicate pair. The MS/MSD spiking solution includes pentachlorophenol (at 100 µg/L), and very good recoveries (78% and 89%) were obtained for this compound in the spiked analyses of SW-09. Therefore, based on professional judgment, the result for pentachlorophenol in SW-04 was rejected (R) as unreliable due to the lack of recovery in the laboratory fortified blank. The result for pentachlorophenol in SW-09 was qualified as estimated (UJ), rather than being rejected, based on the acceptable recoveries of pentachlorophenol in the spiked analyses of this sample, which mitigate the lack of recovery for this analyte in the laboratory fortified blank.

The laboratory narrative in this data package indicates that they are investigating the cause of the poor pentachlorophenol recovery in this quality control analysis. However, in the absence of additional information or raw data review, the qualifiers discussed above must be applied.

Please contact the undersigned at (865) 966-8880 if you have any questions or need further information.

Very truly yours,

TRILLIUM, INC.

Carol A. Erikson

Quality Assessment Manager

Caral a Erikson



STL Connecticut Report #7000-2381A

Mr. Larry McTiernan 15 May 2001 Page 5

Attachments: Table I: Recommendation Summary

Table II: Overall Evaluation of Data

Data Summary Key
Data Validation (DV) Worksheet

Data Summary Table

C:\AllTrillium\Roux SedTransport\2381SV

TABLE I

INDUSTRI-PLEX SITE

STL Connecticut Report #7000-2381A

Recommendation Summary

Sample Nos.	Matrix	TCL SVOCs
SW-04	AQ	$J^{1,2}, R^{1,2}$
SW-09	AQ	$J^{1,2,3}, R^2$

AQ - aqueous

- A = Accept the results for the sample.
- J¹ = Estimate (UJ) the results for benzyl alcohol, benzoic acid, and hexachlorocyclopentadiene due to a high percent difference in the associated continuing calibration standard.
- J² = Estimate (J, UJ) the results for 2,4-dinitrophenol and 2,4,5-trichlorophenol due to poor recoveries in the laboratory fortified blank.
- J³ = Estimate (UJ) the result for pentachlorophenol due to no recovery in the laboratory fortified blank but acceptable recoveries in the matrix spikes using this sample.
- R^1 = Reject (R) result for pentachlorophenol due to no recovery in the laboratory fortified blank.
- R² = Reject (R) the results for benzoic acid due to no recovery in the laboratory fortified blank.

 Note: this qualifier takes precedence over the "UJ" qualifier applied to this analyte above.

TABLE II

INDUSTRI-PLEX SITE STL REPORT #7000-2381A Overall Evaluation of Data

		Semivolatile Organic	Compounds (SVOC	s)	
DQOs (list all DQOs)	Sampling and/or Analytical Method Appropriate Yes or No	hod Measurement Error		Sampling Variability**	Potential Usability Issues
		Analytical Error	Sampling Error*		
The DQO for this site is to collect data of sufficient quality to: 1. Allow a technically sound evaluation of sediment fate and transport, as well as impacts to surface water, in the Hall's Brook Holding Area (HBHA), located just downstream of the Industri-Plex site. 2. Determine if the HBHA sediments are being entrained and/or transported out of the HBHA during storm events. 3. Be representative of the actual site conditions and comparable to other data generated in support of this project.	Analytical Method: Yes SW-846 Method 8270C Sampling Method: Yes Grab	Refer to qualifications in Table I J ^{1,2,3} R ^{1,2}	None		 Lack of recovery of pentachlorophenol in the laboratory fortified blank analysis renders the result for this compound unusable in SW-04. Acceptable MS/MSD recoveries for this compound led to qualification of the result for pentachlorophenol in SW-09 as estimated, rather than rejected. Lack of recovery of benzoic acid in the laboratory fortified blank analysis renders results for this compound unusable in both samples. Results for 2,4-dinitrophenol and 2,4,5-trichlorophenol in both samples were estimated due to poor laboratory fortified blank recoveries. Results for three target analytes were estimated due to calibration variability.

^{*} The evaluation of "sampling error" cannot be completely assessed in data validation.

^{**} Sampling variability is not assessed in data validation.

DATA SUMMARY KEY ORGANIC DATA VALIDATION

- J = The associated numerical value is an estimated quantity.
- R = The data are unusable (compound may or may not be present). Resampling and reanalysis are necessary for verification. The R replaces the numerical value or sample quantitation limit.
- U = The compound was analyzed for, but not detected. The associated numerical value is the sample quantitation limit or the adjusted sample quantitation limit.
- UJ = The compound was analyzed for, but not detected. The associated numerical value is the estimated sample quantitation limit.

Site Name	Industri-Plex
Reference l	

REGION I ORGANIC DATA VALIDATION

The following data package has been validated:	
Lab Name STL Connecticut Case/Project No. SDG No. 4000-2381A No. of Samples/Matrix 11/AO	SOW/Method No. EPA 8770 C Sampling Date(s) 10/19-20/00 Shipping Date(s) 10/20/00 Date Rec'd by lab 10/20/00
Traffic Report Sample Nos. 5W-01, 5W 5W-07, 5W-08, 5W	-02, SW-03, SW-04, SW-05, W-09, SW-10
Trip Blank No. —— Equipment Blank No. —— Bottle Blank No. —— Field Duplicate Nos. —— PES Nos. —— Trip Blank No. —— Field Blank No. —— Field Duplicate Nos. —— Field Dup	
The Region I. EPA-NE Data Validation Functional Gurevision 10/96 was used to evaluate the data a Functional Guidelines were used to evaluate the data and criteria from EPA approved QAPjP or amendment to examine the data and criteria from EPA approved QAPjP or amendment to examine the data and criteria from EPA approved QAPjP or amendment to examine the data and criteria from EPA approved QAPjP or amendment to examine the data and criteria from EPA approved QAPjP or amendment to examine the data and criteria from EPA approved QAPjP or amendment to examine the data and criteria from EPA approved QAPjP or amendment to examine the data and criteria from EPA approved QAPjP or amendment to examine the data and criteria from EPA approved QAPjP or amendment to examine the data and criteria from EPA approved QAPjP or amendment to examine the data and criteria from EPA approved QAPjP or amendment to examine the data and criteria from EPA approved QAPjP or amendment to examine the data and criteria from EPA approved QAPjP or amendment to examine the data and criteria from EPA approved QAPjP or amendment to examine the data and criteria from EPA approved QAPjP or amendment to examine the data and criteria from EPA approved QAPjP or amendment to examine the data and criteria from EPA approved QAPjP or amendment to examine the data and criteria from EPA approved QAPjP or amendment to examine the data and criteria from EPA approved QAPjP or amendment to examine the data and criteria from EPA approved QAPjP or amendment to examine the data and criteria from EPA approved QAPjP or amendment to examine the data and criteria from EPA approved QAPjP or amendment to examine the data approximation to examine the data and criteria from EPA approximation the data and criteria from EPA approximation the data and criteria from EPA approximation the data and criteria from EPA approximation the data and criteria from EPA approximation the data and criteria from EPA approximation the data and criteria from EPA approximation the data and cri	and/or approved modifications to the EPA-NE d are attached to this cover page: (attach modified
A Tier II or Tier III evaluation was used to validate the partial Tier III was used, then identify samples, parameters	
SW-04 and SW-09	only.
The data were evaluated based upon the following para	U
 Overall Evaluation of Data Data Completeness (CSF Audit - Tier I) Preservation & Technical Holding Times GC/MS & GC/ECD Instrument Performance Check Initial & Continuing Calibrations Blanks Surrogate Compounds Internal Standards Matrix Spike/Matrix Spike Duplicate 	 Field Duplicates Sensitivity Check PE Samples/Accuracy Check Target Compound Identification Compound Quantitation and Reported Quantitation Limits TICs Semivolatile and Pesticide/PCB Cleanup System Performance
Region I Definitions and Qualifiers:	
A - Acceptable Data J - Numerical value associated with compound is an R - The data are rejected as unusable. The R replaces U - Compound not detected at that numerical sample UJ - The sample quantitation limit is an estimated quant TB, BB, EB - Compound detected in aqueous trip bla blank associated with soil/sediment samples.	the numerical value or sample quantitation limit. quantitation limit. ntity.
Validator's Name Caro Erikson Company Na	ume Trillium INC Phone Number 865-946-8880
	Date Validation Completed 5/15/01

Data Validation Worksheet Cover Page - Page 2

Check if all criteria are met and no hard copy worksheet provided. Indicate NA if worksheet is not applicable to analytical method. Note: there is no standard worksheet for System Performance, however, the validator must document all system performance issues in the Data Validation Memorandum.

VOA/SV worksheets:

	VOA/SV-Pest/PCB	COMPLETE SDG FILE (CSF) AUDIT	✓,
	VOA/SV-Pest/PCB-I	PRESERVATION AND HOLDING TIMES	7
	VOA/SV-II	GC/MS INSTRUMENT PERFORMANCE CHECK (TUNING)	
	VOA/SV-III	INITIAL CALIBRATION	
	VOA/SV-IV	CONTINUING CALIBRATION	
	VOA/SV-Pest/PCB-V-A	BLANK ANALYSIS	
	VOA/SV-Pest/PCB-V-B	BLANK ANALYSIS	
	VOA-VI	VOA SURROGATE SPIKE RECOVERIES	JA
	SV-VI	SV SURROGATE SPIKE RECOVERIES	47,
	VOA/SV-VII	INTERNAL STANDARD PERFORMANCE	
	VOA/SV-Pest/PCB-VIII	MATRIX SPIKE/MATRIX SPIKE DUPLICATE	
	VOA/SV-Pest/PCB-IX	FIELD DUPLICATE PRECISION	
	VOA/SV-Pest/PCB-X	SENSITIVITY CHECK	
	VOA/SV-Pest/PCB-XI	ACCURACY CHECK	NK
	VOA/SV-Pest/PCB-XII	TARGET COMPOUND IDENTIFICATION	NA
	VOA/SV-Pest/PCB-XIII	SAMPLE QUANTITATION	NA
	VOA/SV-XIV	TENTATIVELY IDENTIFIED COMPOUNDS	NX
	VOA/SV-XV	SEMIVOLATILE CLEANUP	NN
	TABLE II-WORKSHEET	OVERALL EVALUATION OF DATA	
Pest/PC	B worksheets:	•	
	VOA/SV-Pest/PCB	COMPLETE SDG FILE (CSF) AUDIT	NA
	VOA/SV-Pest/PCB-I	PRESERVATION AND HOLDING TIMES	
	Pest/PCB-IIA	GC/ECD INSTRUMENT PERFORMANCE CHECK-)
	D - man un	RESOLUTION '	
	Pest/PCB-IIB	GC/ECD INSTRUMENT PERFORMANCE CHECK-	(
	D - (DCD HC	RETENTION TIMES	
	Pest/PCB-IIC	GC/ECD INSTRUMENT PERFORMANCE CHECK-	1
	D(DCD HD	ACCURACY CHECK OF INITIAL CALIBRATION	}-
	Pest/PCB-IID	GC/ECD INSTRUMENT PERFORMANCE CHECK-	- 1
	DIDOD III	PESTICIDE DEGRADATION	
	Pest/PCB-III Pest/PCB-IV	INITIAL CALIBRATION CONTINUING CALIBRATION	
	VOA/SV-Pest/PCB-V-A	BLANK ANALYSIS	
	VOA/SV-Pest/PCB-V-A VOA/SV-Pest/PCB-V-B	BLANK ANALYSIS	
	Pest/PCB-VI	SURROGATE COMPOUNDS:	
	Lezh LCD- 41	SPIKE RECOVERIES AND RETENTION TIME SHIFT	ł
	Pest/PCB-VII	PESTICIDE CLEANUP	
	VOA/SV-Pest/PCB-VIII	MATRIX SPIKE/MATRIX SPIKE DUPLICATE	
	VOA/SV-Pest/PCB-VIII	FIELD DUPLICATE PRECISION	
	VOA/SV-Pest/PCB-IX	SENSITIVITY CHECK	
	VOA/SV-Pest/PCB-XI	ACCURACY CHECK	
	Pest/PCB-XII	COMPOUND IDENTIFICATION	
	VOA/SV-Pest/PCB-XIII	SAMPLE QUANTITATION	
	TABLE II-WORKSHEET	OVERALL EVALUATION OF DATA	-
	TABLE II-WORKSHEET	OTENALL LINEONITOR OF DATA	<u></u>

I certify that all criteria were met for the worksheets checked above.

Signature: Caukson	Name: Carol A. Enkson
-ate:	

III. INITIAL CALIBRATION - List all analytes that are outside calibration criteria.

Date of ICAL	Instrument	Parameter	Matrix	Compound	% RSD	RRF	Samples Affected	Action	
10/27/00	HP597/Q	5√	AQ		al1430				
11/3/00	11	5V	A-62		30.57		HCCPD	None (M 5/M	SD
						_		0	neg
						.			
					 -				
					-		<u> </u>		
			-		-				
				-					
						-			
Comments:									
					<u>-</u> .	·			

Validator: ________ Date: ______

IV. CONTINUING CALIBRATION - List all analytes that are outside calibration criteria.

Date of ICAL	Date of CCAL	Instrument	Parameter	Matrix	Compound	%D	RRF	Samples Affected	Action
10/27/00	11/2/00	HP5971Q	5√	AQ	benzoie acid HCCPD	27.7			UJ
					benjoie acid	28.1	/		
+	+	1	1	1	HCCPD	30,4	/		+
						<u> </u>	_		
11/3/00	11/3/00	1+P5971Q	<u>5V</u>	AQ			V		
			<u></u>						
	·						· 		
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Comments:									
									I

Validator: Caguiksor Date: 5/14/01

EPA-NE - Data Validation Worksheet VOA/SV - Pest/PCB-V-A

\mathbf{v}_{-}	RI.	Αľ	VK.	ΛN	Δ1	LYSIS
7 .	$\nu \nu$	11	117	CALA.	~,	

List the blank contamination below.			Concentration	Level: Low
Sampler: Cluris Milone	Company: Poux Assoc., Inc.	Contacted:	Yes No	Date:
4 7 4 4 5 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6	· · · · · · · · · · ·			

1. Laboratory: Method, Storage and Instrument Blanks

Date Extracted	Date Analyzed	Parameter/ Matrix	Sample No. (Blank Type)	Instrument/ Column	Compound	Conc. (units)
10/20/00	11/100	5V/AQ	SBULLO/method	-HP5971Q	DEP	0.4 mg/L
						
	<u> </u>					
				•		

2. Field: Equipment (Rinsate), Trip and Bottle Blanks

Date Analyzed	Parameter/ Matrix	Sample No. (Blank Type)	lustrument/ Column	Compound	Conc. (units)
11/2/00	SVIAQ	Field Blank	HP5971Q	BaEHP	InglL
					
	Analyzed	Analyzed Matrix	Analyzed Matrix (Blank Type)	Analyzed Matrix (Blank Type) Column	Analyzed Matrix (Blank Type) Column

Validator: Cagrik Sor	Date: 5/14/01	- ^_
-----------------------	---------------	------

EPA-NE - Data Validation Worksheet VOA/SV - Pest/PCB-V-B

3. Blank Actions - List the maximum concentrations of blank compounds.

Compound	Type of Blank	Date Blank Sampled/Originated	Max. Conc. (units)	Action Level (units)	Sample QL	Sam Affe	ples cted	Action	
D6P	method	10/20/00	0,4 49/4	4 Mg/L	10	5004	-09	None -	MÌ
DEP B2EHP	method Field	10/20/00	Jugil	10 regil	10	11	1.	None -	Wi
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Comments:		
Validator:	Ca Erit Son	Date: 5/14/01

EPA-NE - Data Validation Worksheet VOA/SV - Pest/PCB-X

X. Si	ENSITIVITY	CHECK	(Method	Detection	Limit Study)
--------------	------------	-------	---------	-----------	--------------

List all compounds, surrogates, and internal standards that are outside the MDL criteria.

•	Has an appropriate MDL study been submitted with seven replicates for each compound and matrix of interest?	Y	N
•	Date of Preparation/Analysis: Within 1 year?	\mathbf{Y}	N
•	Instrument I.D.: Same as samples?	Y	N
•	Column I.D.: Same as samples?	Y	N

Matrix	Compound	MDL > QL	Method QC Limits < 80% or > 120%	IS Outside Area Count and/or RT Criteria	RSD > 20%	Samples Affected	Action
							
						_	

If an MDL study has not been submitted, use only the LFB results to evaluate data.

(Laboratory Fortified Blank) - List all LFB compounds, surrogates and internal standards that are outside criteria.

Has an appropriate and complete LFB been submitted at the proper frequency?

Does it contain all target compounds at the method-required QLs?

Was the LFB spiked with a standard from a source (vendor) independent of the calibration standard?

Matrix	Compound	Method QC Limits < 60% or > 140% Other:	IS Outside Area Count and/or RT Criteria	Samples Affected	Action
AQ	beyore acid	070 (QC 0-25	90) —	SW-04, -09	R
AQ	245 trichlorophenol	58% (QC, 71-	(24%) -	$\mu = 0$	UJ
AQ	2,4-dinitrophend	3590 (UC 70	-139%)	11 11	UJ
AQ	pentachlorophenal	0% (web	3-12592 -	11 1/	R-5W-04
					UJ-5W-09

Validator:	Ca Eriksor	Date:	5/14/01
			, ,

Post-Turnover Storm



356 FARRAGUT CROSSING DR. KNOXVILLE, TN 37922

(423) 966-8880 FAX (423) 966-8885 cerikson@trilliuminc.com

May 18, 2001

Mr. Larry McTiernan Roux Associates, Inc. 25 Corporate Drive Suite 230 Burlington, MA 01803

Subject:

STL Connecticut Report No. 7000-2957A

Downgradient Transport (Surface Water and Sediments) Investigation

Industri-Plex Site

Woburn, Massachusetts

Total TAL Metals: 1/Surface Water/SW-09

1/Field Blank

Selected Total Metals:

2/Surface Waters/SW-01, SW-10

(Field Duplicates: SW-01/SW-10)

Dissolved Arsenic:

3/Surface Waters/SW-01, SW-09, SW-10

(Field Duplicates: SW-01/SW-10)

1/Field Blank

Total Suspended Solids:

3/Surface Waters/SW-01, SW-09, SW-10

(Field Duplicates: SW-01/SW-10)

1/Field Blank

Dear Mr. McTiernan:

A Tier II validation was performed on the inorganic analytical data for one surface water sample collected by Roux Associates, Inc. at the Industri-Plex Site in Woburn, Massachusetts. Several additional samples were also reported in this data package, but, per project specifications, only the results for SW-09 were validated. The samples were analyzed according to EPA Methods 6010B/7470A, as applicable, for metals and EPA Method 160.2 for TSS. For SW-09, the full TAL (target analyte list, per the Contract Laboratory Program) was reported for the total metals fraction and arsenic only was reported for the dissolved fraction.

The data were evaluated as Tier II level in accordance with the "Region I Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses" dated June 13, 1988, and the project-specific Quality Assurance Project Plan (QAPP). The evaluation was based on the following parameters:

HOME OFFICE:

28 GRACE'S DRIVE • COATESVILLE, PA19320 • (610) 383-7233 • FAX (610) 383-7907 OFFICES IN:



STL Connecticut Report #7000-2957A

Mr. Larry McTiernan 18 May 2001 Page 2

- Overall Evaluation of Data and Potential Usability Issues.
- Data Completeness.
- * Preservation and Technical Holding Times.
- * Instrument Calibration.
 - Contract Required Detection Limit (CRDL) Standards.
 - Blanks
- Inductively Coupled Plasma (ICP) Interference Check Samples.
- Matrix Spike (MS).
- Laboratory Duplicates.
 - Field Duplicates.
- Laboratory Control Sample.
 - ICP Serial Dilution Analysis.
- * Detection Limit Results.
- NA PE Samples/Accuracy Check.
 - Sample Quantitation
- * = All criteria were met for this parameter.
- NA = Not Applicable.

Note: Worksheets for QC parameters that met criteria or are not applicable to the method will not be included as attachments to this document.

Table I summarizes the validation recommendations which were based on the following information. Table II summarizes the overall evaluation of the data with reference to the data quality objectives (DQOs) and potential usability issues.

Overall Evaluation of Data and Potential Usability Issues

Metals

The DQO for this site is to collect data of sufficient quality to allow a technically sound evaluation of sediment fate and transport, as well as impacts to surface water, in the Hall's Brook Holding Area (HBHA), located just downstream of the Industri-Plex site. The primary intended use for the data is to determine if the HBHA sediments are being entrained and/or transported out of the HBHA during storm events. The primary analytical objective is that measurements be representative of the actual site conditions and that data resulting from field sampling and analysis activities be comparable.

Sample results for metals were qualified as the result of measurement error, which includes both analytical (laboratory) error and sampling (field) error. Measurement error associated with analysis





Mr. Larry McTiernan 18 May 2001 Page 3

includes unacceptable CRDL standard recoveries for thallium and lead and laboratory blank contamination. There was one major impact on data usability.

• The result for copper in SW-09 was qualified as less than the reported value based on laboratory blank contamination.

Measurement error associated with sample collection includes field blank contamination. There was one major impact on data usability:

• Results for calcium and magnesium in SW-09 were qualified as less than the reported values based on field blank contamination.

Total Suspended Solids (TSS)

Sample results for TSS were qualified as the result of measurement error, which in this case includes only sampling (field) error, or, more specifically, unacceptable field duplicate comparisons. There were no major impacts on data usability.

Data Completeness

No raw data were included in the data package. This is inconsistent with Region I guidelines, which specify that full Tier III deliverables are to be provided for all data packages no matter what level of validation is to be performed. However, the lack of raw data is acceptable to the client and does not adversely affect the Tier II validation effort. Therefore, no further action was taken on this basis.

No documentation of sample pHs was provided in the data package. At the request of the validator, the laboratory provided a copy of their Preservative Record, dated 12/20/00, via facsimile on 5/17/01. This document confirmed that all samples for metals analysis were properly preserved, and was inserted into the data package by the validator to ensure that accurate and complete documentation is available for future reference.

CRDL Standards

The following analytes did not meet recovery criteria in the CRDL standard analyses.

Analyte	%REC	Limits	Action
lead	124.4, 134.5	80-120%	J
thallium	75.6	80-120%	UJ



Mr. Larry McTiernan 18 May 2001 Page 4 STL Connecticut Report #7000-2957A

Results for thallium and lead in SW-09 were less than 3xCRDL and were qualified as indicated above based on the unacceptable CRDL standard recoveries.

No CRDL standard was run for mercury in association with these sample analyses.

Blanks

The following analytes were detected in associated blanks:

Analyte	Type of Blank	Maximum Concentration	Action Level	Action
Barium	Field	3.0 μg/L	15.0 μg/L	None
Calcium	Field	18,000 μg/L	90,000 μg/L	U
Copper	Calibration	2.5 μg/L	12.5 μg/L	U
Magnesium	Field	2180 μg/L	10,900 μg/L	U
Manganese	Field	3.9 μg/L	19.5 μg/L	None
Potassium	Field	454 μg/L	2,270 μg/L	None
Sodium	Field	2700 μg/L	13,500 μg/L	None
Zinc	Field	7.8 μg/L	39.0 μg/L	None

Barium, manganese, potassium, sodium, and zinc were present in the sample at concentrations exceeding the action limit for each analyte; therefore, no qualifiers were warranted for these elements based on blank contamination.

Results for calcium, copper, and magnesium in SW-09 were qualified as less than the reported values (U) based on blank contamination.

Field Duplicates

The RPD for the following analyte was greater than the maximum acceptance criterion of 50 RPD:

Field Duplicate Pair	Analyte	RPD	Action
SW-01/SW-10	TSS	61.2	J



Mr. Larry McTiernan 18 May 2001 Page 5 STL Connecticut Report #7000-2957A

One of the paired TSS results was below 5xCRDL, but the alternate acceptance criterion for low concentrations (±CRDL) was also not met. Therefore, the result for TSS in SW-09 was qualified as estimated (UJ) on this basis.

Serial Dilution

The serial dilution result for sodium was more than 10% different from the original, undiluted analysis result (10.9%). However, since the %D did not exceed 15%, no qualifiers were applied on this basis per Region I guidelines.

Sample Quantitation

Results for nickel and dissolved arsenic in SW-09 were qualified as estimated (J) because they are less than twice the applicable instrument detection limit. All "B" flags applied by the laboratory to sample results below the applicable CRDL were removed.

Please contact the undersigned at (865) 966-8880 if you have any questions or need further information.

Very truly yours,

TRILLIUM, INC.

Carol A. Erikson

Quality Assessment Manager

Caral G. Eriksor

CAE/das



STL Connecticut Report #7000-2957A

Mr. Larry McTiernan 18 May 2001 Page 6

Attachments: Table I: Recommendation Summary

Table II: Overall Evaluation of Data

Data Summary Key Data Summary Tables
Data Validation (DV) Worksheets

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TABLE I

INDUSTRI-PLEX SITE

STL Connecticut Report #7000-2957A

Recommendation Summary

Sample Nos.	Matrix	Total TAL Metals	Dissolved Arsenic	TSS
SW-09	AQ	$A^1, J^{1,2}$	J^3	J⁴

AQ - aqueous

- A = Accept the results for the sample.
- A¹ = Accept the results for the sample, but qualify the positive results for calcium, copper, and magnesium as not detected (U) due to blank contamination.
- J¹ = Estimate (J, UJ) the results for lead and thallium due to unacceptable CRDL standard recoveries.
- J^2 = Estimate (J) the result for nickel because it is less than twice the applicable instrument detection limit.
- J³ = Estimate (J) the result for dissolved arsenic because it is less than twice the applicable instrument detection limit.
- J⁴ = Estimate the result for TSS due to poor reproducibility in the associated field duplicate analyses.

TABLE II

INDUSTRI-PLEX SITE STL REPORT #7000-2957A Overall Evaluation of Data

	Total TAL Metals,	Selected TAL Metals, Di	issolved Arsenic, and	l Total Suspende	d Solids		
DQOs (list all DQOs)	Sampling and/or Analytical Method Appropriate Yes or No	Measurement Error		Measurement Error		Sampling Variability**	Potential Usability Issues
		Analytical Error	Sampling Error*				
The DQO for this site is to collect data of sufficient quality to: 1. Allow a technically sound evaluation of sediment fate and transport, as well as impacts to surface water, in the Hall's Brook Holding Area (HBHA), located just downstream of the Industri-Plex site. 2. Determine if the HBHA sediments are being entrained and/or transported out of the HBHA during storm events. 3. Be representative of the actual site conditions and comparable to other data generated in support of this project.	Analytical Method: Yes SW-846 Methods 6010B (metals), 7471A (mercury) and 160.2 (TSS) Sampling Method: Yes Grab	Refer to qualifications in Table I A¹ J¹.2.3	Refer to qualifications in Table I A¹ J⁴		 Results for calcium, copper, and magnesium in SW-09 were qualified as less than the reported values due to blank contamination. Results for lead and thallium in SW-09 were estimated due to unacceptable CRDL standard recoveries. Results for nickel and dissolved arsenic in SW-09 were estimated because they were less than 2xIDL. The result for TSS in SW-09 was estimated due to poor reproducibility in the associated field duplicate analyses. 		

- * The evaluation of "sampling error" cannot be completely assessed in data validation.
- ** Sampling variability is not assessed in data validation.



DATA SUMMARY KEY INORGANIC DATA VALIDATION

J = The associated value is an estimated quantity.
 R = The data are unusable. (Note: Analyte may or may not be present).
 U = The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.
 UJ = The material was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

DATA SUMMARY FORM: TOTAL TAL METALS WATER SAMPLES (ug/L)

STL Report No. 7000-2957A Site Name: Industri-Plex Sample Number SW-09 Lab ID 002957A-02 Date Sampled 18-Dec-00 CRDL Aluminum 204 200 5.0 U 60 Antimony 9.0 10 Arsenic 200 Barium 28.1 Beryllium 1.0 U 5 1.0 U Cadmium 5 32700 U 5000 Calcium 2.0 U 10 Chromium 50 Cobalt 6.5 25 Copper 6.6 U 1500 100 Iron 3 Lead 3.5 J Magnesium 5270 U 5000 357 15 Manganese 0.2 Мегецту 0.10 U 2.9 J 40 Nickel 5000 Potassium 8750 4.0 U Selenium 5 2.0 U 10 Silver 81200 Sodium 5000 10 Thallium 10.0 UJ Vanadium 2.0 U 50 20 187 Zinc

Page 1 of 1

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DATA SUMMARY FORM: SELECTED DISSOLVED METAL WATER SAMPLES

(ug/L)

Site Name: In	ndustri-Plex	· <u>-</u> ,	STL Report No. 7000-2957A
Sample Number Lab ID Date Sampled	SW-09 002957A-02 18-Dec-00		
CRDL 10 Arsenic	3.9 J		
10 Passile			
			\Roux SedTransport\2957in2

DATA SUMMARY FORM: TOTAL SUSPENDED SOLIDS WATER SAMPLES (mg/L)

Site Name: Inc	lustri-Plex			. ,		STL Rep	ort No.	7000 -2957 A	L		
Sample Number	SW-09	 		· · · · · · · · · · · · · · · · · · ·] - 3 					
Lab ID	001915A-01	 _i				4			<u> </u>		
Date Sampled	29-Aug-00	 ·		· · · · · · · · · · · · · · · · · · ·		! !			! 		
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CRDL							1				
5.0 TSS	5.0 UJ	 	:			<u>. </u>					
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REGIO	N I	
Data	Review	Worksheets

Site Name	Industri-Plex
Reference	Number

REGION I REVIEW OF INORGANIC CONTRACT LABORATORY DATA PACKAGE

, Trillium, Inc.		
The hardcopied (laboratory name) 51 C	mnecticut data pac	kage received
at Region I has been reviewed and the	quality assurance ar	d performance
data summarized. The data review incl	uded:	p
		1.1.
Case No. 7000 -2457A SAS No	Sampling Date(s)	12/18/00
SDG. No. Matrix AS	Shipping Date(s)	12/19/00
No. of Samples 4	Date Rec'd by Lab	12/20/00
	-	
ان م قدم ان م	20	
Traffic Report Nos: SW-01, SW	-09, SW-10	· ·
Trip Blank No.:		
Equipment Blank No.: Geld Blank	<u> </u>	, <u> </u>
Equipment Blank No.: Field Blank Field Dup Nos: Sw-01/5w-	10	 _
EPA 4010B/74(3)A 1403.		
SOW No. requires that specific	analytical work be	done and that
associated reports be provided by the	laboratory to the R	egions, EMSL-
LV, and SMO. The general criteria used	to determine the per	ciormance were
based on an examination of:		
Date	. Wield Dunlimeter	
-Data Completeness	-Field Duplicates	
-Holding Times	-Lab Control Samp	
-Calibrations	-Furnace AA Resul	
-Blanks	-ICP Serial Dilut	
-ICP Interference Check Results	-Detection Limit	
-Matrix Spike Recoveries	-Sample Quantitat	ion
-Laboratory Duplicates	_	
Overall Comments: Tier II Validati	on- 5w-09 only	/
overall commencs.	A	······································
		
Definitions and Qualifiers:		
A - Acceptable data.		
J - Approximate data due to quality	control criteria.	
R - Reject data due to quality contr		
U - Analyte not detected.		
00 6		ر ایراب
Reviewer: <u>Alukton</u>	Date:	2/18/01
	·	, <u> </u>

I. DATA COMPLETENESS

MISSING INFORMATION	DATE LAB CONTACTED	DATE REC'D
<u>raw data</u>	OK per client - no ac	ction
sample pHs	5/16/01	5/17/01
·		

プロロウベルカキのチー・・ ビュ・フォー キカカタ とりの (の

II. HOLDING TIMES

Complete table for all samples and circle the analysis date for samples not within criteria.

SAMPLE ID	DATE SAMPLED	:	,	OTHERS DATE ANALYSIS	Hq	ACTION
5w-09	12/18/00	1/9/01-140/01 1/10/01-lun		1/8/01-Prep 1/9/12-run	12	None
						-

METALS - 180 DAYS FROM SAMPLE COLLECTION MERCURY - 28 DAYS FROM SAMPLE COLLECTION CYANIDE - 14 DAYS FROM SAMPLE COLLECTION

ACTION:

PO 30H1

- If holding times are exceeded all positive results are 1. estimated (J) and non-detects are estimated (UJ).
- If holding times are grossly exceeded, the reviewer may determine that non-detects are unusable (R). 2.

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III B. INSTRUMENT CALIBRATION (Section 2)

2.	Analytical	Sequence
----	------------	----------

Did the							
standard SOW?	s for ca	librati	on as	desci	ribed	in	the

Yes or No

B. Were calibrations performed at the beginning of each analysis?



C. Were calibration standards analyzed at the beginning of sample analysis and at a minimum frequency of ten percent or every two hours during analysis, whichever is more frequent?

Yes or No

D. Were the correlation coefficients for the calibration curves for AA, Hg, and CN ≥ 0.995? wetder or No

E. Was a standard at 2xCRDL analyzed for all ICP analyses?

Yes or No

If No.

The data may be affected. Use professional judgement to determine the severity of the effect and qualify the data accordingly. Discuss any actions below and list the samples affected.

CEDL Stal:	Pb	124.4 70, 134.570	
	TR	75.6 70	

EZEMBELBINI - AZ 171 - 1007 D.B. 100

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IV A. BLANK ANALYSIS RESULTS (Sections 1-3)

1. L	aboratory Blanks			matrix: AQ
DATE	ICB/CCB#	PREP BL	ANALYTE	CONC, JUNITS
1/9/01	CCB2		Zn_	6.7 Mg/L
	ccs4		Cu	2.5 mg/L
	Andready of the contract of th			
				· · · · · · · · · · · · · · · · · · ·
2. E	quipment/Trip Bla <u>EQUIP BL#</u>		NALYTE	CONC. (UNITED
			a	CONC. /UNITS
12/18/0	O HEIR DILLIA	/	Ca Ca	3.0 µg/L
···		·	Ma	2180 ug/L
		· \		20 11
		\	Mn	3.9 Mg/L
			<u>K</u>	454 ug/L
3. F	requency Requireme	nts	Na En	2700 ug/L 7.8 mg/L
A			alyzed for each	
	for every 20 s batch?	amples and f	or each digesti	on Yes or No
В			n every 10 samp more frequent?	
If No	,			
τ	he data may be af!	ected. Use	professional j	udgement to determine
the s	everity of the ef ctions below, and	fect and qua	lify the data	accordingly. Discuss

and the second second

130000F0707 07107 7507/10/60

IV B. BLANK ANALYSIS RESULTS (Section 4)

4. Blank Actions

co mus

The Action Levels for any analyte is equal to five times the highest concentration of that element's contamination in any blank. The action level for samples which have been concentrated or diluted should be multiplied by the concentration/dilution factor. No positive sample result should be reported unless the concentration of the analyte in the sample exceeds the Action Level (AL). Specific actions are as follows:

- 1. When the concentration is greater than the IDL, but less than the Action Level, report the sample concentration detacted with a U.
- 2. When the sample concentration is greater than the Action Level, report the sample concentration unqualified.

MATRIX:_	<u> </u>			MATRIX:	AQ
ELEMENT	MAX. CONC./ UNITS	AL/ UNITS	ELEMENT	MAX. CONC./ UNITS	AL/ UNITS
Ca FB	18,000 Mg/L 2.5 Mg/L	90,000 ugl	Zn c	8 7.8 ug1L	39.0 ug/L
Cu cos	2.5 uglL	12.5 ug1			
Ba FB	3.0 ugil	15.0 Mg/L			
Mg FB	2180 ugil	10,900 Mg/L			
Mn FB	3.9 ugil	19.5 MAIL			
K FB	454 ugiL	2270 Mg) L			,
NaFB	454 mg/L 2700 mg/L	13,500 ugil			

NOTE: Blanks analyzed during a soil case must be converted to mg/kg in order to compare them with the sample results.

Conc. in ug/L X Volume diluted to (200ml) X 1L X 1000mm X 1mg = mg/kg Weight digested (1gram) 1000ml 1kg 1000ug

Multiplying this result by 5 to arrive at the action level gives a final result in mg/kg which can then be compared to sample results.

VIII. FIELD DUPLICATES

List the concentrations of all analytes in the field duplicate pair. For soil duplicates, calculate the CRDL in mg/kg using the mample weight, volume and percent solids data for the sample. Indicate what criteria was used to evalute the precision by circling either the RRD or CRDL for each element.

MATRIX:

					,	, .
Element	CRD	L	Sample #	<u>Duplicates</u>	RPD	Action
	water	<u>soil</u>	-5w-01	SW-10		
	ug/L	mg/kg				
Aluminum	200_				1	
Antimony	60_					
Arsenic	10					
Barium	200					
Beryllium	5				!!	
Cadmium	5_					•
Calcium	5000			,		
Chromium	10		All I			
Cobalt	50					
Copper	25	-				
Iron	100	-]	
Lead	5					
Magnesium_	5000					***********
Manganese	15					
Mercury	0.2					
Nickel	40-			* - · - · · · · · · · · · · · · · · · ·	<u> </u>	
Potassium	5000					
Selenium	<u>5</u> -	!- -		·		
Silver	10-1					
Sodium	5000				ļ!	
Thallium	10-					
Vanadium	50-					
Zinc	20	 !				
Cyanide	10-					
122		···················	12 10	26.10	1/01.2	1 0
Field Dunli	cate Act	ions sho	ould be applic	ed to all oth	A RAM	ples of
same matrix						F

ACTIONS:

same matrix type.

- Estimate (J) positive results for elements which have an RPD >30% for waters and >50% for soils.
- 2. If sample results are less than 5x the CRDL, estimate (J) positive results and (UJ) nondetected results for elements whose absolute difference is >2xCRDL, (4xCRDL for soils). If both samples are nondetected, the RPD is not calculated (NC).

XI. IND	OCTIVELY	COUPLED	PLASHA (ICP)	SERIAL DILUTI	OH ANALYS	IS
	of the	diluted s	were perfor ample analys diluted anal	med for each is agreed wit ysis.	matrix an hin ten p	d results ercent of
	Serial	Dilutions	were not pe	rformed for th	e followi	ng:
	not agr	ee within	were perfor 10% for ans re dilution.	med, but anal lyte concentra	ytical re tions gre	sults did ater than
			that do no ilution analy	t meet the r	equired 1	aboratory
MATRIX:_	AQ			,		
ELEMENT	IDL	50xIDL	SAMPLE RESULT	SERIAL DILUTION	₹D	ACTION
Aluminum Barium Berylliu Cadmium Calcium Chromium Cobalt Copper Iron Lead Magnesiu Manganes Nickel Potassiu Silver Sodium Vanadium	50	2500	81,220	90,075	70.9	None (<15 %)
Zinc	- 				İ	

Actions apply to all samples of the same matrix.

ACTIONS:

Estimate (J) positive results if \$D >15.



356 FARRAGUT CROSSING DR. KNOXVILLE, TN 37922

(423) 966-8880 FAX (423) 966-8885 cerikson@trilliuminc.com

May 15, 2001

Mr. Larry McTiernan Roux Associates, Inc. 25 Corporate Drive Suite 230 Burlington, MA 01803

Subject:

STL Connecticut Report No. 7000-2957A

Downgradient Transport (Surface Water and Sediments) Investigation

Industri-Plex Site

Woburn, Massachusetts

SVOCs:

3/Surface Waters/SW-01, SW-09, SW-10

(Field Duplicates: SW-01/SW-10)

1/Field Blank

Dear Mr. McTiernan:

A Tier II validation was performed on the organic analytical data for one surface water sample collected by Roux Associates, Inc. at the Industri-Plex Site in Woburn, Massachusetts and reported in the above-referenced laboratory report. Additional samples were also reported in this data package, but, per project specifications, only the results for SW-09 were validated. All of the samples were analyzed according to EPA Method 8270C for semivolatile organic compounds (SVOCs). For SW-09, the full TCL (target compound list, per the Contract Laboratory Program), with cyclohexanone added as a target analyte, was reported.

The data were evaluated as Tier II level in accordance with the "Region I EPA NE Data Validation Functional Guidelines for Evaluating Environmental Analyses" dated December 1996, and the project-specific Quality Assurance Project Plan (QAPP), dated September 14, 1999. The evaluation was based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues.
- Data Completeness.
- Preservation and Technical Holding Times.
- NA Gas Chromatography/Electron Capture Detector (GC/ECD) Instrument Performance Checks.
- * Initial and Continuing Calibration.



STL Connecticut Report #7000-2957A

Mr. Larry McTiernan 15 May 2001 Page 2

- Blanks.
- * Surrogate Compounds.
- Internal Standards.
- Matrix Spike (MS)/Matrix Spike Duplicates (MSD).
- * Field Duplicates.
 - Sensitivity Check (Method Detection Limit Study or Laboratory Fortified Blank).
- NA PE Samples/Accuracy Check.
- NA Target Compound Identification.
- NA Sample Quantitation and Reported Quantitation Limits.
- NA SVOC and Pesticides Cleanup.
- NA System Performance.
- * = All criteria were met for this parameter.
- NA = Not Applicable.

Note: Worksheets for QC parameters that met criteria or are not applicable to the method will not be included as attachments to this document.

Table I summarizes the validation recommendations which were based on the following information. Table II summarizes the overall evaluation of the data with reference to the data quality objectives (DQOs) and potential usability issues.

Overall Evaluation of Data and Potential Usability Issues

The DQO for this site is to collect data of sufficient quality to allow a technically sound evaluation of sediment fate and transport, as well as impacts to surface water, in the Hall's Brook Holding Area (HBHA), located just downstream of the Industri-Plex site. The primary intended use for the data is to determine if the HBHA sediments are being entrained and/or transported out of the HBHA during storm events. The primary analytical objective is that measurements be representative of the actual site conditions and that data resulting from field sampling and analysis activities be comparable.

SVOC sample results were qualified as the result of measurement error, which in this case includes only analytical (laboratory) error. Measurement error associated with sample analysis includes method and field blank contamination and poor LFB performance. There was one major impact on data usability:

• The result for bis(2-ethylhexyl)phthalate was qualified as less than the sample-specific contract required quantitation limit due to method and field blank contamination.





Mr. Larry McTiernan 15 May 2001 Page 3

Data Completeness

No raw data were included in the data package. This is inconsistent with Region I guidelines, which specify that full Tier III deliverables are to be provided for all data packages no matter what level of validation is to be performed. However, the lack of raw data is acceptable to the client and does not adversely affect the Tier II validation effort. Therefore, no further action was taken on this basis.

Blanks

The following compounds were reported in the associated method and field blanks:

Compound	Blank Type	Max Conc.	Action Limit	Action
bis(2-ethylhexyl)phthalate	Field	l μg/L	10 μg/L	Ū
isophorone	Field	0.9 μg/L	4.5 μg/L	None - ND

The result for bis(2-ethylhexyl)phthalate was qualified as less than the sample-specific contract required quantitation limit (CRQL) due to the associated blank contamination.

Laboratory Fortified Blank

Recovery of 2,4,5-trichlorophenol (65%; QC 71-124%) was unacceptably low in the laboratory fortified blank analysis. The result for 2,4,5-trichlorophenol in SW-09 was qualified as estimated (UJ) on this basis.

Compared to the laboratory-specific acceptance limits, an unacceptably high recovery of benzoic acid (38%; QC 0-25%) was reported in the laboratory fortified blank analysis. No action was taken on this basis, however it is worth noting that "acceptance" limits of 0-25% strongly suggest that this is <u>not</u> a good analytical method for this particular compound.



STL Connecticut Report #7000-2957A

Mr. Larry McTiernan 15 May 2001 Page 4

Please contact the undersigned at (865) 966-8880 if you have any questions or need further information.

Very truly yours,

TRILLIUM, INC.

Carol A. Erikson

Quality Assessment Manager

Carala Erikson

CAE/das

Attachments: Table I: Recommendation Summary

Table II: Overall Evaluation of Data

Data Summary Key

Data Validation (DV) Worksheet

Data Summary Table

C:\AllTrillium\Roux SedTransport\2957SV

TABLE I

INDUSTRI-PLEX SITE

STL Connecticut Report #7000-2957A

Recommendation Summary

Sample Nos.	Matrix	TCL SVOCs
SW-09	AQ	A^1, J^1

AQ - aqueous

- A¹ = Accept the results for the sample, but qualify the result for bis(2-ethylhexyl)phthalate as not detected (U) at the sample-specific CRQL due to blank contamination.
- J¹ = Estimate (UJ) the result for 2,4,5-trichlorophenol due to poor recovery in the laboratory fortified blank.

TABLE II

INDUSTRI-PLEX SITE STL REPORT #7000-2957A Overall Evaluation of Data

		Semivolatile Organic	Compounds (SVOC	s)			
DQOs (list all DQOs)	Sampling and/or Analytical Method Appropriate Yes or No	Measurement Error		Measurement Error		Sampling Variability**	Potential Usability Issues
		Analytical Error	Sampling Error*				
The DQO for this site is to collect data of sufficient quality to: 1. Allow a technically sound evaluation of sediment fate and transport, as well as impacts to surface water, in the Hall's Brook Holding Area (HBHA), located just downstream of the Industri-Plex site. 2. Determine if the HBHA sediments are being entrained and/or transported out of the HBHA during storm events. 3. Be representative of the actual site conditions and comparable to other data generated in support of this project.	Analytical Method: Yes SW-846 Method 8270C Sampling Method: Yes Grab	Refer to qualifications in Table I A¹ J¹	None		1. The result for bis(2-ethylhexyl)phthalate was qualified as less than the sample-specific CRQL due to blank contamination. 2. The result for 2,4,5-trichlorophenol was estimated due to a poor laboratory fortified blank recovery.		

- * The evaluation of "sampling error" cannot be completely assessed in data validation.
- ** Sampling variability is not assessed in data validation.

DATA SUMMARY KEY ORGANIC DATA VALIDATION

- J = The associated numerical value is an estimated quantity.
- R = The data are unusable (compound may or may not be present). Resampling and reanalysis are necessary for verification. The R replaces the numerical value or sample quantitation limit.
- U = The compound was analyzed for, but not detected. The associated numerical value is the sample quantitation limit or the adjusted sample quantitation limit.
- UJ = The compound was analyzed for, but not detected. The associated numerical value is the estimated sample quantitation limit.

DATA SUMMARY TABLE - TCL SEMIVOLATILE ORGANICS 1 WATER SAMPLES (ug/L)

Site Name: Industri-Plex STL Report #7000-2957A

Sample Number	SW-09			 -	··	1		1	
Lab ID	002957A-02	ii-						i	
Dilution Factor*	1.00								
Date Sampled	18-Dec-00			_,					
Date Extracted	22-Dec-00					· !!		<u>-</u>	-
Date Analyzed	03-Jan-01			-1 -	i	- 5		ļ — — — — — — — — — — — — — — — — — — —	
CRQL**	03341101				- 	- 11 20		ļ	
10 Cyclohexanone			<u>-</u>						
10 Phenol	<u> </u>			· · · ——	_			<u></u>	
10 bis(2-Chloroethyl)ether	 			·				 	
10 2-Chlorophenol	ļ			· · · · · · · · · · · · · · · · · · ·			———— —	<u> </u>	i
10 1,3-Dichlorobenzene	 			 		+			
					·				
10 1,4-Dichlorobenzene					·	+ ++		 	
10 Benzyl alcohol	 			_					
10 1,2-Dichlorobenzene						: :		· i	
10 2-Methylphenol	 		· · ·	··•	· ·				·· —·
10 bis(2-chloroisopropyl)ether					;	٠ ,			
10 4-Methylphenol								<u> </u>	<u>-</u>
10 N-Nitroso-di-n-propylamine				·		. :		<u>i</u>	_4 ;
10 Hexachloroethane					 - •			ļ	·
10 Nitrobenzene				_ :	-+			 	
10 Isophorone			· · · · · · · · · · · · · · · · · · ·			- i		ļ	
10 2-Nitrophenol		<u>.</u>		.		_			
10 2,4-Dimethylphenol			· · · · · · · · · · · · · · · · · · ·			1		<u> </u>	
50 Benzoic acid			i	i					_;
10 bis(2-Chloroethoxy)methane						;			
10 2,4-Dichlorophenol				1					
10 1,2,4-Trichlorobenzene	T					1			1
10 Naphthalene				:	1				

^{*} includes adjustment for use of a sample volume slightly smaller than 1000 mL

[\]Roux SedTransport\2957SV

^{**} blank spaces mean the analyte was not detected; sample-specific CRQLs are equal to unadjusted CRQL times the DF

DATA SUMMARY TABLE - TCL SEMIVOLATILE ORGANICS 2 WATER SAMPLES (ug/L)

Site Name: Industri-Plex

STL Report #7000-2957A

Sample Number	SW-09		i						
Lab ID	002957A-02		li						
Dilution Factor*	1.00								
Date Sampled	18-Dec-00		i i .				<u></u> _		· · · · · · · · · · · · · · · · · · ·
Date Extracted	22-Dec-00						j		
Date Analyzed	03-Jan-01	1			il.				
CRQL**					<u> </u>	,. <u>.</u>	iL		
10 4-Chloroaniline							<u> </u>	1	
10 Hexachlorobutadiene				!		:			
10 4-Chloro-3-methylphenol				: -	i		·		
10 2-Methylnaphthalene									
10 Hexachlorocyclopentadiene				<u>.</u>			<u> </u>		:
10 2,4,6-Trichlorophenol									<u>;</u>
50 2,4,5-Trichlorophenol	UJ			<u> </u>					
10 2-Chloronaphthalene							j	1	
50 2-Nitroaniline									
10 Dimethylphthalate									<u> </u>
10 Acenaphthylene							i i		
10 2,6-Dinitrotoluene									
50 3-Nitroaniline				:					
10 Acenaphthene				i_					
50 2,4-Dinitrophenol								1	
50 4-Nitrophenol									
10 Dibenzofuran				i i					
10 2,4-Dinitrotoluene									
10 Diethylphthalate									
10 4-Chlorophenyl-phenylether					i				
10 Fluorene									i
50 4-Nitroaniline		· · · · · · · · · · · · · · · · · · ·			Í	<u> </u>			
* includes adjustment for use of a sar	mple volume slightly sm	naller than 1000 ml			1 .		\Roux SedTra	insport\2957SV	

^{*} includes adjustment for use of a sample volume slightly smaller than 1000 mL

^{**} blank spaces mean the analyte was not detected; sample-specific CRQLs are equal to unadjusted CRQL times the DF

DATA SUMMARY TABLE - TCL SEMIVOLATILE ORGANICS 3 WATER SAMPLES (ug/L)

Site Name: Industri-Plex

STL Report #7000-2957A

Sample Number	SW-09					i:			
Lab ID	002957A-02						<u></u>		
Dilution Factor*	1.00				·				
Date Sampled	18-Dec-00			.i .i					
Date Extracted	22-Dec-00			ř <u> </u>					
Date Analyzed	03-Jan-01								
QL**			···· <u>-</u>	Ĺ					
50 4,6-Dinitro-2-methylphenol			· · · · · · · · · · · · · · · · · · ·		:				!
10 N-Nitrosodiphenylamine					_	·			
10 4-Bromophenyl-phenylether									
10 Hexachlorobenzene			i	i					
50 Pentachlorophenol									
10 Phenanthrene									!
10 Anthracene									
10 Di-n-butylphthalate						<u> </u>			!
10 Fluoranthene	0.6 J								
10 Pyrene	0.4 J	:						<u>.</u>	
10 Butylbenzylphthalate		:		:					
20: 3,3'-Dichlorobenzidine				i 1	;				
10 Benzo(a)anthracene									- · · - · · · · · · · · · · · · · · · ·
10 Chrysene									
10 bis(2-Ethylhexyl)phthalate	10 U						, . <u></u>	·-· ·- ·-	
10 Di-n-octylphthalate	0.3 J			İ					
10 Benzo(b)fluoranthene		i i i i i i i i i i i i i i i i i i i			.]			_	
10 Benzo(k)fluoranthene				i i					
10 Benzo(a)pyrene									
10 Indeno(1,2,3-cd)pyrene				i					
10 Dibenz(a,h)anthracene								:	
10 Benzo(g,h,i)perylene									

^{*} includes adjustment for use of a sample volume slightly smaller than 1000 ml.

^{**} blank spaces mean the analyte was not detected; sample-specific CRQLs are equal to unadjusted CRQL times the DF

Site Name	Industri	-Pley
Reference N	No	

REGION I ORGANIC DATA VALIDATION

The following data package has been validated:	
Lab Name <u>STL Connecticut</u> Case/Project No. SDG No. <u>1000-2957A</u> No. of Samples/Matrix <u>4/AQ</u> Traffic Report Sample Nos. <u>Sw-01</u> , S	SOW/Method No. $EPA = 8070C$ Sampling Date(s) $10/18/01 = 10/18/00$ Shipping Date(s) $12/19/00$ Date Rec'd by lab $12/20/00$ $w-09$, $Sw-10$
Trip Blank No. Equipment Blank No. Bottle Blank No. Field Duplicate Nos. PES Nos.	
The Region I. EPA-NE Data Validation Functional Gurevision 18 96 was used to evaluate the data a Functional Guidelines were used to evaluate the data and criteria from EPA approved QAPjP or amendment to the second secon	and/or approved modifications to the EPA-NE d are attached to this cover page: (attach modified
A Tier II or Tier III evaluation was used to validate the partial Tier III was used, then identify samples, parameters	e data (circle one). If a Tier II validation with a eters, etc. that received partial Tier III validation
SW-09 only	
The data were evaluated based upon the following para	ameters:
 Overall Evaluation of Data Data Completeness (CSF Audit - Tier I) Preservation & Technical Holding Times GC/MS & GC/ECD Instrument Performance Check Initial & Continuing Calibrations Blanks Surrogate Compounds Internal Standards Matrix Spike/Matrix Spike Duplicate 	 Field Duplicates Sensitivity Check PE Samples/Accuracy Check Target Compound Identification Compound Quantitation and Reported Quantitation Limits TICs Semivolatile and Pesticide/PCB Cleanup System Performance
Region I Definitions and Qualifiers:	
A - Acceptable Data J - Numerical value associated with compound is an R - The data are rejected as unusable. The R replaces U - Compound not detected at that numerical sample UJ - The sample quantitation limit is an estimated quantital BB, EB - Compound detected in aqueous trip blablank associated with soil/sediment samples.	the numerical value or sample quantitation limit. quantitation limit. ntity.
Validator's Name <u>Carol Erikson</u> Company Na Date Validation Started <u>514101</u>	ame Trillium, Inchone Number 8659668880
Date Validation Started 51401	Date Validation Completed5/15/01

Data Validation Worksheet Cover Page - Page 2

Check if all criteria are met and no hard copy worksheet provided. Indicate NA if worksheet is not applicable to analytical method. Note: there is no standard worksheet for System Performance, however, the validator must document all system performance issues in the Data Validation Memorandum.

VOA/SV worksheets:

VOA/SV-Pest/PCB VOA/SV-II VOA/SV-III VOA/SV-III VOA/SV-IV VOA/SV-Pest/PCB-V-A VOA/SV-Pest/PCB-V-B VOA-VI SV-VI VOA/SV-Pest/PCB-VIII VOA/SV-Pest/PCB-IX VOA/SV-Pest/PCB-X VOA/SV-Pest/PCB-XI VOA/SV-Pest/PCB-XIII VOA/SV-Pest/PCB-XIII VOA/SV-Pest/PCB-XIII VOA/SV-Pest/PCB-XIII VOA/SV-Pest/PCB-XIII VOA/SV-XV TABLE II-WORKSHEET B worksheets:	COMPLETE SDG FILE (CSF) AUDIT PRESERVATION AND HOLDING TIMES GC/MS INSTRUMENT PERFORMANCE CHECK (TUNING) INITIAL CALIBRATION CONTINUING CALIBRATION BLANK ANALYSIS BLANK ANALYSIS VOA SURROGATE SPIKE RECOVERIES SV SURROGATE SPIKE RECOVERIES INTERNAL STANDARD PERFORMANCE MATRIX SPIKE/MATRIX SPIKE DUPLICATE FIELD DUPLICATE PRECISION SENSITIVITY CHECK ACCURACY CHECK TARGET COMPOUND IDENTIFICATION SAMPLE QUANTITATION TENTATIVELY IDENTIFIED COMPOUNDS SEMIVOLATILE CLEANUP OVERALL EVALUATION OF DATA	NA NA NA
VOA/SV-Pest/PCB	COMPLETE SDG FILE (CSF) AUDIT	NA
VOA/SV-Pest/PCB-I	PRESERVATION AND HOLDING TIMES	
Pest/PCB-IIA	GC/ECD INSTRUMENT PERFORMANCE CHECK-	-/
 Pesti PCD-ILA		1
D (DOD 11)	RESOLUTION	
Pest/PCB-IIB	GC/ECD INSTRUMENT PERFORMANCE CHECK-	1
	RETENTION TIMES	
Pest/PCB-IIC	GC/ECD INSTRUMENT PERFORMANCE CHECK-	
	ACCURACY CHECK OF INITIAL CALIBRATION	1
Pest/PCB-IID	GC/ECD INSTRUMENT PERFORMANCE CHECK-	
	PESTICIDE DEGRADATION	1
Pest/PCB-III	INITIAL CALIBRATION	
Pest/PCB-IV	CONTINUING CALIBRATION	
VOA/SV-Pest/PCB-V-A	BLANK ANALYSIS	
VOA/SV-Pest/PCB-V-A	BLANK ANALYSIS	+
Pest/PCB-VI	SURROGATE COMPOUNDS:	
PESUFCE-VI	SPIKE RECOVERIES AND RETENTION TIME SHIFT	
D MOD MIN		
Pest/PCB-VII	PESTICIDE CLEANUP	
VOA/SV-Pest/PCB-VIII	MATRIX SPIKE/MATRIX SPIKE DUPLICATE	
VOA/SV-Pest/PCB-IX	FIELD DUPLICATE PRECISION	
VOA/SV-Pest/PCB-X	SENSITIVITY CHECK	
VOA/SV-Pest/PCB-XI	ACCURACY CHECK	
Pest/PCB-XII	COMPOUND IDENTIFICATION	
VOA/SV-Pest/PCB-XIII	SAMPLE QUANTITATION	
TABLE II-WORKSHEET	OVERALL EVALUATION OF DATA	7
		

I certify that all criteria were met for the worksheets checked above.

Signature: Carold Exiktor	Name: Carol A. Eriksor
-ate: 5/14/01	

EPA-NE - Data Validation Worksheet VOA/SV - Pest/PCB-V-A

\mathbf{V} .	RI.	ANK	ANA	I	YSIS
7 .	$\boldsymbol{\mu}$			ъ.	4 8 67367

List the blank contamination below.		Concentration Level: Low
Sampler: Martin Haines	Company: Rowe Assoc. Inc.	Contacted: Yes No Date:

1. Laboratory: Method, Storage and Instrument Blanks

Date Extracted	Date Analyzed	Parameter/ Matrix	Sample No. (Blank Type)	Instrument/ Column	Compound	Conc. (units)
12/20/00	1/3/01	SV/AQ	SBLKTGE/method	HP597/Q	B2 EHP	0.8 mg/L

2. Field: Equipment (Rinsate), Trip and Bottle Blanks

Date Extracted	Date Analyzed	Parameter/ Matrix	Sample No. (Blank Type)	Instrument/ Column	Compound	Conc. (units)
00/88/51	01/03/01	SVIAQ	Field Blank	HP5971Q	isophorone	0.9 Mg/L
					isophorone B2EHP	1 ug/L
			· · · · · · · · · · · · · · · · · · ·			
						

Validator: Caguik Gor	Date: 5/14/01
	•

EPA-NE - Data Validation Worksheet VOA/SV - Pest/PCB-V-B

3. Blank Actions - List the maximum concentrations of blank compounds.

Compound B2EHP	Type of Blank	Date Blank Sampled/Originated	Max. Conc. (units)	Action Level (units)	Sample QL	Samples Affected	Action
isophorone	field	12/20/00	1.0Myl	10 Mg/L 4.5 Mg/L	10	5W-09 5W-09	U
	O			J-1		JW-0]	Noxo-1
							

Comments: BJEHPalsoin MB @ 0-8 ug/L	
Validator: Cagaik Sor	
	Date: 5/14/01

		-	Detection Limit S d internal standar	tudy) ds that are outside t	he MDL crite	ria.		
Date o Instrun	appropriate MI f Preparation/Ai nent I.D.:	nalysis: Same as	Within 1 ye	seven replicates for ar?	r each compou	and matrix c	of interest?	Y Y Y Y
Matrix	Compound	MDL > QL	Method QC Limits < 80% or > 120%	IS Outside Area Count and/or RT Criteria	RSD > 20%	Samples Affecte	ed	Action
MDI			L I ED		.1-4-		<u> </u>	
ooratory I Has an Does it	Fortified Blank) appropriate and contain all targ) - List all L l complete L	FB compounds, s FB been submitte ds at the method-	results to evaluate surrogates and interest at the proper free required QLs? (vendor) independer	nal standards t quency?		criteria.	Ÿ
ooratory I Has an Does it	Fortified Blank) appropriate and contain all targ) - List all L l complete L tet compound tith a standar	JFB compounds, so JFB been submitted at the method-red from a source of Method QC Limits < 60% or > 140%	surrogates and interest at the proper free required QLs? (vendor) independent IS Outside Area Count and/or RT	nal standards to quency? nt of the calib		criteria.	Y
Has an Does it Was th	Fortified Blank) appropriate and contain all targ e LFB spiked w) - List all L l complete L get compound ith a standar	FB compounds, so FB been submitted at the method-rd from a source of Method OC Limits	surrogates and intersed at the proper free required QLs? (vendor) independer IS Outside Area Count and/or RT Criteria	nal standards to quency? nt of the calib	ration standard?		Y Y ion
Has an Does it Was th	appropriate and contain all targe LFB spiked w Compou	complete L let compound the a standar	JFB compounds, so JFB been submitted at the method-rd from a source of Method QC Limits < 60% or > 140% Other:	surrogates and interest at the proper free required QLs? (vendor) independer IS Outside Area Count and/or RT Criteria	nal standards to quency? Int of the calibration of	ration standard? les Affected	Acti	

Spring Storm 1

356 FARRAGUT CROSSING DR. KNOXVILLE, TN 37922

> (423) 966-8880 FAX (423) 966-8885 cerikson@trilliuminc.com

July 5, 2001

Mr. Larry McTiernan Roux Associates, Inc. 25 Corporate Drive Suite 230 Burlington, MA 01803

Subject: STL Connecticut Report No. 7001-0698A

Downgradient Transport (Surface Water and Sediments) Investigation

Industri-Plex Site

Woburn, Massachusetts

Total TAL Metals: 1/Surface Water/SW-09

1/Field Blank

Selected Total Metals: 8/Surface Waters/SW-01, SW-02, SW-03, SW-05,

SW-06, SW-07, SW-09A, SW-10 (Field Duplicates: SW-01/SW-10)

Dissolved Arsenic: 7/Surface Waters/SW-01, SW-02, SW-03, SW-05, SW-07,

SW-09, SW-10

(Field Duplicates: SW-01/SW-10)

1/Field Blank

Total Suspended Solids: 9/Surface Waters/SW-01, SW-02, SW-03, SW-05,

SW-06, SW-07, SW-09, SW-09A, SW-10

(Field Duplicates: SW-01/SW-10)

Dear Mr. McTiernan:

A Tier II validation was performed on the inorganic analytical data for nine surface water samples collected by Roux Associates, Inc. at the Industri-Plex Site in Woburn, Massachusetts. The samples were analyzed according to EPA Methods 6010B/7470A, as applicable, for metals and EPA Method 160.2 for TSS. For SW-09, the full TAL (target analyte list, per the Contract Laboratory Program) was reported for the total metals fraction and arsenic only was reported for the dissolved fraction. For SW-01, SW-02, SW-03, SW-05, SW-06, SW-07, and SW-09A, arsenic, chromium, lead, and mercury were reported for the total metals fraction; dissolved arsenic was analyzed and reported in all of these samples except SW-06 and SW-09A. TSS was analyzed and reported for all nine samples.

The data were evaluated as Tier II level in accordance with the "Region I Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses" dated June 13, 1988, and the project-HOME OFFICE:

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Mr. Larry McTiernan 5 July 2001 Page 2

specific Quality Assurance Project Plan (QAPP). The evaluation was based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues.
- Data Completeness.
- Preservation and Technical Holding Times.
- Instrument Calibration.
 - Contract Required Detection Limit (CRDL) Standards.
 - Blanks.
 - Inductively Coupled Plasma (ICP) Interference Check Samples.
 - Matrix Spike (MS).
- Laboratory Duplicates.
- Field Duplicates.
- * Laboratory Control Sample.
 - ICP Serial Dilution Analysis.
- * Detection Limit Results.
- NA PE Samples/Accuracy Check.
 - Sample Quantitation
- * = All criteria were met for this parameter.
- NA = Not Applicable.

Note: Worksheets for QC parameters that met criteria or are not applicable to the method will not be included as attachments to this document.

Table I summarizes the validation recommendations which were based on the following information. Table II summarizes the overall evaluation of the data with reference to the data quality objectives (DQOs) and potential usability issues.

Overall Evaluation of Data and Potential Usability Issues

Metals

The DQO for this site is to collect data of sufficient quality to allow a technically sound evaluation of sediment fate and transport, as well as impacts to surface water, in the Hall's Brook Holding Area (HBHA), located just downstream of the Industri-Plex site. The primary intended use for the data is to determine if the HBHA sediments are being entrained and/or transported out of the HBHA during storm events. The primary analytical objective is that measurements be representative of the actual site conditions and that data resulting from field sampling and analysis activities be comparable.



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Sample results for metals were qualified as the result of measurement error, which includes both analytical (laboratory) error and sampling (field) error. Measurement error associated with analysis includes unacceptable recoveries for lead, selenium, and thallium in the CRDL standards, unacceptable interference check sample results for copper, an unacceptable matrix spike recovery for selenium, unacceptable serial dilution results for potassium, sodium, and zinc, and laboratory blank contamination. There were several major impacts on data usability:

- Results for cobalt, nickel, potassium, silver, thallium, and vanadium in SW-09 were qualified as less than the reported values (U) due to laboratory blank contamination.
- Results for mercury in SW-10 and SW-05 were qualified as less than the reported values (U) due to laboratory blank contamination.
- The result for selenium in SW-09 was rejected (R) due to a very poor matrix spike recovery.

Measurement error associated with sample collection includes field blank contamination. There was one major impact on data usability:

• The result for copper in SW-09 was qualified as less than the reported value (U) based on field blank contamination.

Total Suspended Solids (TSS)

All quality control criteria were met for the TSS analyses of these samples.

Data Completeness

No raw data were included in the data package. This is inconsistent with Region I guidelines, which specify that full Tier III deliverables are to be provided for all data packages no matter what level of validation is to be performed. However, the lack of raw data is acceptable to the client and does not adversely affect the Tier II validation effort. Therefore, no further action was taken on this basis.

CRDL Standards

The following analytes did not meet recovery criteria in the CRDL standard analyses:



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Analyte	%REC	Limits	Action
selenium	78.2, 50.9%	80-120%	UJ
thallium	143, 135%	80-120%	J
lead	134%	80-120%	J

The positive results reported for thallium in SW-09 and for lead in SW-09, SW-03, and SW-09A were less than 3xCRDL and were qualified as estimated (J) based on the unacceptably high recoveries listed above.

Sclenium was not detected above the IDL in SW-09 and was qualified as estimated (UJ) due to the unacceptably low recoveries listed above.

No CRDL standard was run for mercury in association with these sample analyses.

Blanks

The following analytes were detected in associated blanks.

Analyte	Type of Blank	Maximum Concentration	Action Level	Action
Antimony	Calibration	5.1 μg/L	25.5 μg/L	None
Barium	Field	2.1 μg/L	10.5 μg/L	None
Calcium	Field	1280 μg/L	6400 μg/L	None
Cobalt	Preparation	0.836 μg/L	4.2 μg/L	U
Copper	Field	1.4 μg/L	7.0 μg/L	υ
Iron	Field	17.3 μg/L	86.5 μg/L	None
Magnesium	Field	255 μg/L	1275 μg/L	None
Manganese	Field	3.0 μg/L	15.0 μg/L	None
Mercury	Calibration	0.1 μg/L	0.5 μg/L	U
Nickel	Calibration	0.9 μg/L	4.5 μg/L	U
Potassium	Preparation	1206 µg/L	6030 μg/L	υ
Silver	Preparation	1.199 µg/L	6.0 μg/L	U



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Analyte	Type of Blank	Maximum Concentration	Action Level	Action
Sodium	Field	445 μg/L	2225 μg/L	None
Thallium	Calibration	9.0 μg/L	45.0 µg/L	U
Vanadium	Calibration	0.6 μg/l.	3.0 μg/L	U
Zinc	Field	7.3 μg/L	36.5 μg/L	None

Barium, calcium, iron, magnesium, manganese, sodium, and zinc were present in SW-09 at concentrations exceeding the action limit for each analyte; therefore, no qualifiers were warranted for these elements based on blank contamination.

Antimony was not detected above the IDL in SW-09; therefore, no qualifiers were warranted for this element based on blank contamination.

Results for cobalt, copper, nickel, potassium, silver, thallium, and vanadium in SW-09 were qualified as less than the reported values (U) based on the associated blank contamination.

Results for mercury in SW-10 and SW-05 were qualified as less than the reported values (U) based on the associated blank contamination.

In one or more calibration blanks, copper, aluminum, beryllium, and cadmium gave responses that were greater than two times the applicable negative instrument detection limit (IDL). Since these negative responses may indicate the possibility of false negatives, results for beryllium and cadmium in SW-09 were qualified as estimated (UJ). The positive results reported in SW-09 for copper and aluminum were greater than four times the IDL, therefore no action was warranted based on the negative calibration blank responses.

ICP Interference Check Sample

Interference check sample results did not meet the acceptance criterion (80-120% Recovery) for copper (124.0% and 123.0%). The result for copper in SW-09 was qualified as estimated (J) on this basis.

Matrix Spike

An unacceptably low recovery (<30%) was obtained for selenium (22.4%) in the matrix spike analysis of SW-09. The result for selenium in SW-09 was rejected (R) as unreliable on this basis.



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Serial Dilution Analysis

Serial dilution results for potassium (50.6%), sodium (17.8%), and zinc (19.1%) were more than 10% different from the original, undiluted analysis results. Because all of these %D values exceeded 15%, results for potassium, sodium, and zinc in SW-09 were qualified as estimated (J).

Sample Quantitation

Results for total arsenic in SW-01 and for dissolved arsenic in SW-07 were qualified as estimated (J) because they are less than twice the applicable instrument detection limit and were not otherwise qualified. All "B" flags applied by the laboratory to sample results below the applicable CRDL were removed.

Please contact the undersigned at (865) 966-8880 if you have any questions or need further information.

Very truly yours,

TRILLIUM, INC.

Carol A. Erikson

Quality Assessment Manager

Carol a Erik 501

CAE/ekd

Attachments: Table I: Recommendation Summary

Table II: Overall Evaluation of Data

Data Summary Key Data Summary Tables

Data Validation (DV) Worksheets

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TABLE I

INDUSTRI-PLEX SITE

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Recommendation Summary

Sample Nos.	Matrix	Total TAL Metals	Selected Metals	Dissolved Arsenic	TSS
SW-09	AQ	A ^{1,2} , J ^{1,2,3,4,5} , R ¹	NA	A	Α
SW-01	AQ	NA	J _e	А	Α
SW-02	AQ	NΛ	A	Α	Α
SW-03	ΛQ	NA	J^2	Α	Α
SW-05	AQ	NA	A ³	A	A
SW-06	AQ	NA	A	NA	A
SW-07	AQ	NA	Α	J ⁷	A
SW-09A	AQ	NΛ	J^2	NΛ	A
SW-10	AQ	NA	A^3	A	Α

AQ - aqueous

NA - not analyzed

- Λ = Accept the results for the sample.
- A¹ = Accept the results for the sample, but qualify the positive results for cobalt, nickel, potassium, silver, thallium, and vanadium as not detected (U) due to laboratory blank contamination.
- A² = Accept the results for the sample, but qualify the positive result for copper as not detected (U) due to field blank contamination.
- A³ = Accept the results for the sample, but qualify the positive results for mercury as not detected (U) due to laboratory blank contamination.



- J¹ = Estimate (J, UJ) the results for thallium and selenium due to unacceptable CRDL standard recoveries. The result for selenium in SW-09 was also rejected; the "R" qualifier takes precedence.
- J^2 = Estimate (J) the results for lead due to an unacceptably high recovery in the CRDL standard.
- J³ = Estimate (UJ) the results for beryllium and cadmium due to negative calibration blank responses.
- J^4 = Estimate (UJ) the result for copper due to unacceptable interference check sample results.
- J⁵ = Estimate (J) the results for potassium, sodium, and zinc due to unacceptable serial dilution analysis results.
- J^6 = Estimate (J) the result for total arsenic because it is less than twice the applicable instrument detection limit and was not otherwise qualified.
- J⁷ = Estimate (J) the result for dissolved arsenic because it is less than twice the applicable instrument detection limit and was not otherwise qualified.
- R¹ = Reject (R) the result for sclenium due to an unacceptably low (<30%) recovery in the matrix spike analysis.

INDUSTRI-PLEX SITE STL REPORT #7001-0698A Overall Evaluation of Data

	Total TAL Metals, Selected TAL Metals, Dissolved Arsenic, and Total Suspended Solids							
DQOs (list all DQOs)	Sampling and/or Analytical Method Appropriate Yes or No	Measurement Error		Sampling Variability**	Potential Usability Issues			
		Analytical Error	Sampling Error*					
The DQO for this site is to collect data of sufficient quality to: 1. Allow a technically sound evaluation of sediment fate and transport, as well as impacts to surface water, in the Hall's Brook Holding Area (HBHA), located just downstream of the Industri-Plex site. 2. Determine if the HBHA sediments are being entrained and/or transported out of the HBHA during storm events. 3. Be representative of the actual site conditions and comparable to other data generated in support of this project.	Analytical Method: Yes SW-846 Methods 6010B (metals), 7471A (mercury) and 160.2 (TSS) Sampling Method: Yes Grab	Refer to qualifications in Table I A ^{1,3} J ^{1,2,3,4,5,6,7} R ¹	Refer to qualifications in Table I A ²		 Numerous results were qualified as not detected at the reported values due to laboratory and field blank contamination. Results for thallium and selenium in SW-09 were qualified as estimated due to unacceptable CRDL standard recoveries. Three sample results for lead were estimated due to a high recovery in one of the CRDL standard analyses. Results for beryllium and cadmium in SW-09 were estimated due to negative calibration blank responses. The result for copper in SW-09 was estimated due to interference check sample results. Results for potassium, sodium, and zinc in SW-09 were estimated due to serial dilution results. Two sample results were estimated because they were less than twice the IDL. The result for selenium in SW-09 was rejected due to a very low matrix spike recovery. 			

^{*} The evaluation of "sampling error" cannot be completely assessed in data validation.

^{**} Sampling variability is not assessed in data validation.



DATA SUMMARY KEY INORGANIC DATA VALIDATION

- J = The associated value is an estimated quantity.
- R = The data are unusable. (Note: Analyte may or may not be present).
- U = The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.
- UJ = The material was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

DATA SUMMARY FORM: TOTAL TAL METALS WATER SAMPLES (ug/L)

	Site Name: Inc	łustri-Plex	STL Report No. 7000-0698A
	Sample Number	SW-09	
	Lab ID	010698A-01	
	Date Sampled	23-Mar-01	
CRDL_			
200	Aluminum	163	
60	Antimony	3.6 U	
10	Arsenic	14.2	
200	Barium	26.7	
5	Beryllium	0.20 UJ	
5	Cadmium	0.30 UJ	
5000	Calcium	24800	
10	Chromium	2.3	
50	Cobalt	1.3 U	
25	Соррег	6.6 UJ	
100	Iron	1490	
3	Lead	3.3 J	
5000	Magnesium	3560	
15	Manganese	219	
0.2	Mercury	0.10 U	
40	Nickel	2.7 U	
5000	Potassium	4780 UJ	
5	Selenium	R	
10	Silver	1.0 U	
5000	Sodium	46300 J	
10	Thallium	8.4 UJ	
50	Vanadium	1.4 U	
20	Zinc	82.2 J	
			\Roux SedTransport\0698in

Page 1 of 1

DATA SUMMARY FORM: SELECTED TOTAL METALS WATER SAMPLES

(ug/L)

Site Name: Industri-Plex

STL Report No. 7000-0698A

Sam	ple Number Lab ID	SW-01 010698A-02	SW-10 010698A-03	SW-02 010698A-04	SW-03 010698A-05	SW-05 010698A-06	SW-06 010698A-07	SW-07 010698A-08	SW-09A 010698A-09
Date Sampled	F	23-Mar-01	26-Mar-01	26-Mar-01	26-Mar-01	26-Mar-01	26-Mar-01	26-Mar-01	
				<u>; </u>					
RDL									<u> </u>
10 Ar	senic	3.6 J	7.6	3.5 U	22.0	3,5 U	8.4	7.7:	3.5 U
10 CI	hromium	33.3	33.9	1.2	3.6	14.0	23.8	7.0	1.8
	ad	34.9	35.2	1.8 U	3.0 J	28.8	63.1	12.6	2.5 J
	егсигу	0.10 U	0.16 U	0.10 U	0.10 U	0.11 U	0.10 U	0.10 U	0.10 U

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DATA SUMMARY FORM: SELECTED DISSOLVED METAL WATER SAMPLES

(ug/L)

Site Name: Industri-Plex

STL Report No. 7000-0698A

	She i taine. In	astr. 1 ten					\$12 mpun.	, , 000 0000		
77. e. e.e.	Sample Number	SW-09	SW-01	SW-10	SW-02	SW-03	SW-05	SW-07		· · .·
	Lab ID	010698A-01	010698A-02	010698A-03	010698A-04	010698A-05	010698A-06	010698A-08		
	Date Sampled	23-Mar-01	23-Mar-01	23-Mar-01	26-Mar-01	26-Mar-01	26-Mar-01	26-Маг-01		
				i	<u>:</u>				<u> </u>	
CRDL		<u>i:</u>		-	j			.	_ 🖟	
10	Arsenic	8.6	3.5 U	3.5 U	3.5 U	10.6	3.5 U	3.7 J		
								,		
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EPA 6010B/7470A Page 1 of 1

DATA SUMMARY FORM: TOTAL SUSPENDED SOLIDS WATER SAMPLES

(mg/L)

Site Name: Industri-Plex

STL Report No. 7001-0698A

	One i teme. In	addit the					4. = 11. p 4		•	
	Sample Number	SW-09	SW-01	SW-10	SW-02	SW-03	SW-05	SW-06	SW-07	SW-09A
	Lab ID	010698A-01	010698A-02	010698A-03	010698A-04	010698A-05	010698A-06	010698A-07	010698A-08	010698A-09
	Date Sampled	23-Mar-01	23-Mar-01	23-Mar-01	26-Mar-01	26-Mar-01	26-Mar-01	26-Mar-01	26-Mar-01	26-Mar-01
				<u> </u>			· · · · · · · · · · · · · · · · · · ·		 :	·
CRDL_						· · · · · · · · · · · · · · · · · · ·				···
5.0	TSS	7.2	62.8	80.6	21.6	35.6	87.2	351	65.8	5.0 U
		 	· · · · · · · · · · · · · · · · · · ·	1 -					· · · · · · · · · · · · · · · · · · ·	
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REGIO	N	I	
Data	Re	view	Worksheets

Site Name	Industri-Plex
Reference	

REGION I REVIEW OF CONTRACT LABORATORY D	ATA PACKAGE
The hardcopied (laboratory name) 57 Com at Region I has been reviewed and the quadata summarized. The data review include	ality assurance and performance
SDG. No. Matrix AQ S	ampling Date(s) 3 23 0 4 3 24 0 ol hipping Date(s) 3 23 0 4 3 24 0 ate Rec'd by Lab 3 24 0 4 3 27 0
SW-06 SW-07, SW-09A Trip Blank No.: Equipment Blank No.: Field Blank Field Dup Nos: SW-01/SW-10 EPA 4010B/7470A/140.2	
-Data Completeness -Holding Times -Calibrations -Blanks -ICP Interference Check Results -Matrix Spike Recoveries -Laboratory Duplicates	-Field Duplicates -Lab Control Sample Results -Furnace AA Results -ICP Serial Dilution Results -Detection Limit Results -Sample Quantitation
Overall Comments: Tier I Validation -	all samples.
	•
Definitions and Qualifiers: A - Acceptable data. J - Approximate data due to quality co R - Reject data due to quality control U - Analyte not detected.	
Reviewer: OEuksor	Date: 7/2/01

I. DATA COMPLETENESS

no. That

MISSING INFORMATION	DATE LAB CONTACTED	DATE REC'D
Raw Data	acceptable to client	- no action taker
		-

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REGION I Data Review Worksheets

III B. INSTRUMENT CALIBRATION (Section 2)

2. Analytical Sequence

- A. Did the laboratory use the proper number of standards for calibration as described in the SOW?
- Yes or No
- B. Were calibrations performed at the beginning of each analysis?
- Yes or No
- C. Were calibration standards analyzed at the beginning of sample analysis and at a minimum frequency of ten percent or every two hours during analysis, whichever is more frequent?

Yes or No

- D. Were the correlation coefficients for the calibration curves for AA, Hg, and CN ≥ 0.995? not doc'd yes or No
- E. Was a standard at 2xCRDL analyzed for all ICP analyses?

Yes or No

If No.

The data may be affected. Use professional judgement to determine the severity of the effect and qualify the data accordingly. Discuss any actions below and list the samples affected.

CPDL	Std:	Beginning -	5e 78.290
		- 0 	Tl 143.3 %
		Ending -	Pb 133.5%
			Se 50.9 %
			Tl 135.2%

***** (1)*********

List the blank contamination in Sections 1 & 2 below. A separate worksheet should be used for soil and water blanks.

1.	Laboratory	Dlanke
4 .	Danoratory	DIGHT

	_			·
DATE	ICB/CCB#	PREP BL	ANALYTE	CONC, /UNITS
3/31/01			<u>Ca</u>	2.497 ug/L
п			Co	0.836 ug/L
			CK	1805.8 Mg/L
			Ag	1.199 MELL
			Na	52.273 Mg/L
-			TI	8.059 Mg/L
				′ ,

2. Equipment/Trip Blanks

DATE	EQUIP BL#	ANALYTE	CONC. /UNITE
3 2001	FB	Ba	2.1 ug/L
		(1280 rig/L
		Co	0.72 ug/L
		Cu	1.4 ugll
	4	Fe	17.3 Mall
			

- 3. Frequency Requirements
 - Was a preparation blank analyzed for each matrix, for every 20 samples and for each digestion batch?
 - Was a calibration blank run every 10 samples or every 2 hours whichever is more frequent?

Yesor	No
Yes or	No

MATRIX: AQ

If No.

The data may be affected. Use professional judgement to determine the severity of the effect and qualify the data accordingly. Discuss any actions below, and list the samples affected.

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10 3044

List the blank contamination in Sections 1 & 2 below. A separate worksheet should be used for soil and water blanks.

1. Labo	oratory Blanks			matrix: AQ
<u>DATE</u>	ICB/CCB#	PREP BL	ANALYTE	CONC, /UNITS
4301	ICB		Ca	3.1 Mg/L
<u></u>		•	Co	0.8
			√Mq	4.5
			<u>√K</u>	612.8
			Ag	0.6.
			Na	37.1
2. Equi	ipment/Trip Bl	anke	TI	5.8
z. Equi	rhwetth trib sr	AIINS	(<u>v</u>	0.6 V
<u>DATE</u>	EQUIP BL#	1	NALYTE	CONC. /UNITS
3/20/01	<u>FB</u>	_	Ma	255 Mg/L
		_	Mn	3.0
			'K	483
			Aa	0.67
	V		Na	445

- 3. Frequency Requirements
 - A. Was a preparation blank analyzed for each matrix, for every 20 samples and for each digestion batch?

Yes or No

B. Was a calibration blank run every 10 samples or every 2 hours whichever is more frequent?

Yes or No

If No.

List the blank contamination in Sections 1 & 2 below. A separate worksheet should be used for soil and water blanks.

1. Lab	oratory Blan	nks		matrix: AQ
DATE	ICB/CCB#	PREP BL	ANALYTE	CONC, /UNITS
4301	CCB 1		<u>Ca</u>	6.8 ug/L
		•	Ma	7.2
			<u> </u>	403.5
			Na	33.0
	CCB2		(3b	5.1.
_ _			Ca	5.7
↓ 2. Equ	↓ ipment/Trip	Blanks	100	0.7

DATE 3 no 01	EQUIP BL#	ANALYTE TI	CONC. JUNITS 7.4 UGIL
<u>u</u>	11	(Zn	7.3 Mg/L

3. Frequency Requirements

Was a preparation blank analyzed for each matrix, A. for every 20 samples and for each digestion batch?

Yes or No

Was a calibration blank run every 10 samples or every 2 hours whichever is more frequent?

Yes or No

If No.

List the blank contamination in Sections 1 & 2 below. A separate worksheet should be used for soil and water blanks.

1. Lab	oratory Blank	s		MATRIX: <u>AQ</u>
DATE	ICB/CCB#	PREP BL	ANALYTE	CONC, /UNITS
4301	CCB2		Ma	2.5 Mg/L
- -			Ha	0.1
			Ni	0.9
			K	869.7
			Ag	0.9.
		-	Na	51.4
2. ₩ Equi	↓ ipment/Trip B	lanks —	TI	5.5
DATE	EQUIP BL		ANALYTE	0.6 CONC. (UNITED
				CONC. /UNITS

3. Frequency Requirements

A. Was a preparation blank analyzed for each matrix, for every 20 samples and for each digestion batch?

Yes or No

B. Was a calibration blank run every 10 samples or every 2 hours whichever is more frequent?

Yes or No

If No.

List the blank contamination in Sections 1 4 2 below. A separate worksheet should be used for soil and water blanks.

	tory Blanks CB/CCB#	PREP BL	ANALYTE	MATRIX: AQ CONC./UNITS
13 01	CC63 ent/Trip Bla		Ca Mg Ni K Ag Na Te	2.5 Mg L 4.2 0.8 664,2 0.8. 44.6 4.8
<u>DATE</u>	EQUIP BL#		ANALYTE	CONC, /UNITS
. Freque	ncy Requireme	ents		

batch?

Yes or No

Was a calibration blank run every 10 samples or В. every 2 hours whichever is more frequent?

Yes or No

If No,

List the blank contamination in Sections 1 & 2 below. A separate worksheet should be used for soil and water blanks.

1. Lat	oratory Blank	S.		MATRIX: AQ
DATE 4 3 01 	CCB4 CCB5	PREP BL	NALYTE K Na Tl V Ca Mg	CONC,/UNITS 725.0 Mg/L 6.4 0.5 11.2 6.4
2. Equ	ipment/Trip	Blanks		
DATE	EOUIP BL	<u>.#</u>	ANALYTE	CONC./UNITS
			· · · · · · · · · · · · · · · · · · ·	

- 3. Frequency Requirements
 - A. Was a preparation blank analyzed for each matrix, for every 20 samples and for each digestion batch?

Yes or No

B. Was a calibration blank run every 10 samples or every 2 hours whichever is more frequent?

Yes or No

If No.

	The	data	may	рe	aff	ecte	d.	Use p	prof	essi.	onal	judgement	to.	determine
the	seve	erity	of	the	ef i	Eect	and	qual.	ify	the	data	according	igly.	Discuss
any	acti	ions	belov	w, a	nd :	list	the	samp)	les	affe	cted.			

List the blank contamination in Sections 1 & 2 below. A separate worksheet should be used for soil and water blanks.

$\mathtt{MATRIX:} \underline{AQ}$
YTE CONC, /UNITS
552.1 µg/L
<u>q</u> 1.0
a 45.5
1 9.0
0.5
$\frac{1}{2 \cdot 1}$

Equipment/Trip Blanks

DATE	EQUIP BL#	ANALYTE	CONC. /UNITS
_			
			

- Frequency Requirements
 - A. Was a preparation blank analyzed for each matrix, for every 20 samples and for each digestion batch?

Yes or No

B. Was a calibration blank run every 10 samples or every 2 hours whichever is more frequent?

Yes or No

If No.

List the blank contamination in Sections 1 & 2 below. A separate worksheet should be used for soil and water blanks.

Laboratory Blanks * responses > 2x (-IDL) MATRIX: AQ DATE ICB/CCB# PREP BL ANALYTE CONC./UNITS Cu ICB -1.4 CCB1 -2.3 CCB2 -89·2 Вe -0.3

Equipment/Trip Blanks

DATE	EQUIP BL#	ANALYTE	CONC. JUNITE
		· .	
	,		
		11-2-11-2-1-2-1-2-1-2-1-2-1-2-1-2-1-2-1	
			

- 3. Frequency Requirements
 - A. Was a preparation blank analyzed for each matrix, for every 20 samples and for each digestion batch?

Yes or No

2.3

B. Was a calibration blank run every 10 samples or every 2 hours whichever is more frequent?

Yes or No

If No.

												below.	A	separate
workshe	et	should	be	used	for	soil	and	water	рī	ani	s.			_

1.	Laboratory Blanks	responses	フax(-IDL)	MATRIX: AQ
DATE	ICB/CCB#	PREP BL	ANALYTE	CONC, /UNITS
43	OJ CCB3		(<u>Cd</u>	-0.6
	11		Cu	-1.8
1	CCB4		VCu_	-2.1
	<u>CCB5</u>		Cu	-2.0
				<u> </u>

2. Equipment/Trip Blanks

DATE	EQUIP BL#	ANALYTE	_conc,/units
		· · · · · · · · · · · · · · · · · · ·	
			

- Frequency Requirements
 - A. Was a preparation blank analyzed for each matrix, for every 20 samples and for each digestion batch?

Yes or No

B. Was a calibration blank run every 10 samples or every 2 hours whichever is more frequent?

Yes or No

If No.

REGION I Data Review Worksheets

IV B. BLANK ANALYSIS RESULTS (Section 4)

4. Blank Actions

The Action Levels for any analyte is equal to five times the highest concentration of that element's contamination in any blank. The action level for samples which have been concentrated or diluted should be multiplied by the concentration/dilution factor. No positive sample result should be reported unless the concentration of the analyte in the sample exceeds the Action Level (AL). Specific actions are as follows:

- 1. When the concentration is greater than the IDL, but less than the Action Level, report the sample concentration detected with a U.
- 2. When the sample concentration is greater than the Action Level, report the sample concentration unqualified.

	MATRIX:_	AQ			MATRIX:	4Q
	ELEMENT	MAX. CONC.	AL/ UNITS	ELEMENT	MAX. CONC./ UNITS	AL/ UNITS
FB	Can	1280 Mg/L	6400 ngl	FB <u>Cu</u>	1.4 Mg/L	7.0 mg/L
PB	Co.	0.836	4.2	FB Fe N	17.3	86.5
PB	<u>K</u> .	1206	6030	FB Mg N	255	1275
PB	Aq.	1.199	6.0	IB/CB V	0.6	3.0
FB	Na	445	2225	FB Mn N	3.0	15.0
CB	<u> 11</u>	9.0	45.0	CB <u>5b</u> "	5.1	25.5
FB	<u>Ba</u> "	2.1	10,5	FB Zn"	7.3	365
CB	Hq ·	0.1	0.5	CB NI'	0.9	4.5

NOTE: Blanks analyzed during a soil case must be converted to mg/kg in order to compare them with the sample results.

Conc. in ug/L X Volume diluted to (200ml) X 1L X 1000gm X 1mg = mg/kg Weight digested (1gram) 1000ml 1kg 1000ug

Multiplying this result by 5 to arrive at the action level gives a final result in mg/kg which can then be compared to sample results.

\$40000 # 0101 # 0102 # 10 400

REGION I Data Review Worksheets

IV B. BLANK ANALYSIS RESULTS (Section 4)

4. Blank Actions

The Action Levels for any analyte is equal to five times the highest concentration of that element's contamination in any blank. The action level for samples which have been concentrated or diluted should be multiplied by the concentration/dilution factor. No positive sample result should be reported unless the concentration of the analyte in the sample exceeds the Action Level (AL). Specific actions are as follows:

- 1. When the concentration is greater than the IDL, but less than the Action Level, report the sample concentration detected with a U.
- 2. When the sample concentration is greater than the Action Level, report the sample concentration unqualified.

responses > 2x (-IDL)

	MATRIX:	AQ			MATRIX:	
	ELEMENT	MAX, CONC. UNITS	∠ AL/ UNITS	ELEMENT	MAX. CONC./ UNITS	AL/ UNITS
сВ	Cu H	-2.3 Mg/L		<u> </u>		
CB	Al:	-89.2				
CB	<u>be</u>	-0.3 -0.6				
-						
	 -					

NOTE: Blanks analyzed during a soil case must be converted to mg/kg in order to compare them with the sample results.

Conc. in ug/L X Volume diluted to (200ml) X 1L X 1000gm X 1mg = mg/kg Weight digested (1gram) 1000ml 1kg 1000ug

Multiplying this result by 5 to arrive at the action level gives a final result in mg/kg which can then be compared to sample results.

REGIO		
Data	Review	Worksheets

U A.	ICP	INTERFERENCE	CKECK	SAMPLE	(Sections	1	£	2	١

1. Recovery Criteria

List any elements in the ICS AB solution which did not mean the criteria for R.

DATE	ELEMENT	4R	ACTIO	· ·	SAMPLES AFFECTE	Ď
4/3/01	<u>Cu</u>	124.0;123.0		-*W _	SW-09	
						
					•	
						
ACTIONS:	* 5W-1	9 result for	Cu "U"	due to be	ank contamina	7167
If an ele below:	ment does no	t meet the ti	R criteri	a , follow	the actions sta	ted
Delow.	•	</td <td>50%</td> <td>ERCENT REC</td> <td><u>overy</u> >120%</td> <td>•</td>	50 %	ERCENT REC	<u>overy</u> >120 %	•
	Sample Resul ted Sample R		R R	J UJ	Ј λ	
2. Frequ	ency Require	ments				
end o	of each sampl	QC samples ne analysis range shift, which	an or a r	inimum of	tvice _	МО
If no,					•	
the sever	rity of the		ualify th	re data acc	gement to determ cordingly. Disc	
						

• ምርቲ (PIOቲግግቲክ)

REGION I Data Review Worksheets

VI. MATRIX SPIKE

TR	ä	5W-09
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MATRIX: AQ

1. Recovery Criteria

List the percent recoveries for analytes which did not meet the required criteria.

S - amount of spike added
SSR - spikes sample result
SR - sample result

Analyte	SSR	SR	s	₹ R	Action
	2,238/16	3.6 U	10	22,4	(5W-09)
					
	·		l 	· ————	

Matrix Spike Actions apply to all samples of the same matrix.

ACTIONS:

- 1. If the sample concentration exceeds the spike concentration by a factor of 4 or more, no action is taken.
- 2. If any analyte does not meet the &R criteria follow the actions stated below:

	PERCENT RECOVERY .		
	<301	304-744	≥1251-
Positive Sample Results	J	J	J
Non-detected Results	R	UJ	A

2. Frequency Criteria

A. Was a matrix spike prepared at the required frequency?



B. Was a post digestion spike analyzed for elements that did not meet required criteria for matrix spike recovery? Se -10270R

FORE CHOSTOTISM

Yes or No

A separate worksheet should be used for each matrix spike pair.

REGION I Data Review Worksheets

	Serial	Dilutions	were not pe	rformed for th	ne followi	ing:
	not agr	ree within	were perfor 10% for ana re dilution.	med, but anal lyte concentra	ytical reations gre	sults did ater than
			that do no	ot meet the r	equired 1	aboratory
ATRIX:_	AQ					
LEMENT	IDL	50xIDL	SAMPLE RESULT	SERIAL DILUTION	1 D	ACTION
minum	\	-			1	
ium		- , , -				
ium_ ylliu		-				-
ium_ ylliu mium_		- -				
ium_ ylliu mium_ cium_	m					
ium_ ylliu mium_ cium_ omium	m					
ium_ylliu yllium_ cium_ omium	m					
yllium_yllium_umium_cium_omium_alt	m					
rium_rylliu dmium_lcium_romium oalt_pper_	m					
rium_rylliudmium_lcium_romiumbalt_pper_on_adad	in					
rium_rylliu imium_lcium_romium oalt_oper_on_ad_gnesium						
uminum rium rylliu dmium lcium romium balt pper on ad gnesiu						
rium rylliu dmium lcium romium balt pper on ad gnesiu nganes ckel	m e		y-1071 TV			
rium_ryllium_ryllium_lcium_romium_oalt_pper_con_ad_gnesiumganes	m e	3700	4784.40	7202,86	50.6	
rium ryllium lcium comium coalt coper con ad gnesium ganes ckel tassiu	m =	_				
rium yllium cium comium calt oper on desium ganes kel cassium ver	m 24.0	370D 260	4784.40 4032479	7202,86	50.4	J*
rium ryllium cium comium calt oper on do gnesium ganes kel cassium	m 24.0	_				



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> [423] 966-8880 FAX [423] 966-8885 cerikson@trilliuminc.com

July 5, 2001

Mr. Larry McTiernan Roux Associates, Inc. 25 Corporate Drive Suite 230 Burlington, MA 01803

Subject:

STL Connecticut Report No. 7001-0698A

Downgradient Transport (Surface Water and Sediments) Investigation

Industri-Plex Site

Woburn, Massachusetts

SVOCs: 7/Surface

7/Surface Waters/SW-01, SW-10, SW-02, SW-03, SW-05, SW-07,

SW-09

(Field Duplicates: SW-01/SW-10)

1/Field Blank

Dear Mr. McTiernan:

A Tier II validation was performed on the organic analytical data for seven surface water samples collected by Roux Associates, Inc., at the Industri-Plex Site in Woburn, Massachusetts and reported in the above-referenced laboratory report. All of the samples were analyzed according to EPA Method 8270C for semivolatile organic compounds (SVOCs). For SW-09, the full TCL (target compound list, per the Contract Laboratory Program), with cyclohexanone added as a target analyte, was reported. For the remaining samples, only the polynuclear aromatic hydrocarbons (PAHs), cyclohexanone, diethylphthalate, 4-methylphenol, and bis(2-ethylhexyl)phthalate were reported.

The data were evaluated as Tier II level in accordance with the "Region I EPA NE Data Validation Functional Guidelines for Evaluating Environmental Analyses" dated December 1996, and the project-specific Quality Assurance Project Plan (QAPP), dated September 14, 1999. The evaluation was based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues.
- Data Completeness.
- Preservation and Technical Holding Times.
- NA Gas Chromatography/Electron Capture Detector (GC/ECD) Instrument Performance Checks.

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STL Connecticut Report #7001-0698A

Mr. Larry McTiernan 5 July 2001 Page 2

- Initial and Continuing Calibration.
 - Blanks.
 - Surrogate Compounds.
- * Internal Standards.
- Matrix Spike (MS)/Matrix Spike Duplicates (MSD).
 - Field Duplicates.
 - Sensitivity Check (Method Detection Limit Study or Laboratory Fortified Blank).
- NA PE Samples/Accuracy Check.
- NA Target Compound Identification.
- NA Sample Quantitation and Reported Quantitation Limits.
- NA SVOC and Pesticides Cleanup.
- NA System Performance.
- * = All criteria were met for this parameter.
- NA = Not Applicable.

Note: Worksheets for QC parameters that met criteria or are not applicable to the method will not be included as attachments to this document.

Table I summarizes the validation recommendations which were based on the following information. Table II summarizes the overall evaluation of the data with reference to the data quality objectives (DQOs) and potential usability issues.

Overall Evaluation of Data and Potential Usability Issues

The DQO for this site is to collect data of sufficient quality to allow a technically sound evaluation of sediment fate and transport, as well as impacts to surface water, in the Hall's Brook Holding Area (HBHA), located just downstream of the Industri-Plex site. The primary intended use for the data is to determine if the HBHA sediments are being entrained and/or transported out of the HBHA during storm events. The primary analytical objective is that measurements be representative of the actual site conditions and that data resulting from field sampling and analysis activities be comparable.

SVOC sample results were qualified as the result of measurement error, which includes analytical (laboratory) and sampling (field) error. Measurement error associated with sample analysis includes method blank contamination and poor laboratory fortified blank performance. There were two major impacts on data usability:

• The result for benzoic acid in SW-09 was rejected (R) because this compound was very poorly recovered in the laboratory fortified blank analysis.



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 The result for di-n-butyl phthalate in SW-09 was qualified as less than the samplespecific contract required quantitation limit (U) due to contamination in the associated method blank.

Measurement error associated with sample collection includes lack of comparability between paired field duplicate results and field blank contamination. Major impacts on data usability include the following:

- Results for butylbenzylphthalate and di-n-octylphthalate in SW-09 were qualified as less than the sample-specific contract required quantitation limits (U) due to contamination in the associated field blank.
- Results for phenanthrene, fluoranthene, pyrene, chrysene, and bis(2-ethylhexyl)phthalate in SW-09, SW-01, SW-10, SW-02, SW-03, and SW-07 were qualified as less than the sample-specific contract required quantitation limits (U) due to contamination in the associated field blank.
- Results for benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)-fluoranthene, benzo(a)pyrene, indeno(1,2,3-ed)pyrene, and benzo(g,h,i)perylene in SW-09, SW-01, SW-10, SW-03, and SW-07 were qualified as less than the sample-specific contract required quantitation limits (U) due to contamination in the associated field blank.
- Results for fluorene and dibenzo(a,h)anthracene in SW-01 were qualified as less than
 the sample-specific contract required quantitation limits (U) due to lack of
 confirmation in the field duplicate analysis.

Data Completeness

No raw data were included in the data package. This is inconsistent with Region I guidelines, which specify that full Tier III deliverables are to be provided for all data packages no matter what level of validation is to be performed. However, the lack of raw data is acceptable to the client and does not adversely affect the Tier II validation effort. Therefore, no further action was taken on this basis.

Blanks

The following compounds were reported in the associated method or field blanks:



Mr. Larry McTiernan STL Connecticut Report #7001-0698A 5 July 2001

Page 4

Compound	Blank Type	Max Conc.	Action Limit	Action
phenanthrene	Field	0.8 μg/L	4.0 μg/L	U
fluoranthene	Field	1.0 μg/L	5.0 μg/L	U
pyrene	Field	0.9 μg/L	4.5 μg/L	U
butylbenzylphthalate	Field	0.5 μg/L	5.0 μg/L	Ŭ
benzo(a)anthracene	Field	0.3 μg/L	1.5 μg/L	U
chrysene	Field	0.5 μg/L	2.5 μg/L	U
bis(2-ethylhexyl)phthalate	Field	3.0 μg/L	30 μg/L	U
di-n-octylphthalate	Field	11 μg/L	110 μg/L	U
benzo(b)fluoranthene	Field	0.6 μg/L	3.0 μg/L	U
benzo(k)fluoranthene	Field	0.5 μg/L	2.5 μg/L	U
benzo(a)pyrene	Field	0.4 μg/L	2.0 μg/l.	U
indeno(1,2,3-cd)pyrene	Field	0.4 μg/L	2.0 μg/L	U
benzo(g,h,i)perylene	Field	0.4 μg/L	2.0 μg/L	U
di-n-butyl phthalate	Method	0.3 μg/L	3.0 μg/L	U

The following results were qualified as less than the sample-specific contract required quantitation limits (U) based on associated blank contamination:

- Results for di-n-butyl phthalate, butylbenzylphthalate, and di-n-octylphthalate in SW-09;
- Results for phenanthrene, fluoranthene, pyrene, chrysene, and bis(2cthylhexyl)phthalate in SW-09, SW-01, SW-10, SW-02, SW-03, and SW-07; and
- Results for benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)-fluoranthene, benzo(a)pyrene, indeno(1,2,3-cd)pyrene, and benzo(g,h,i)perylene in SW-09, SW-01, SW-10, SW-03, and SW-07.



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Surrogates

An unacceptably low recovery (40%; QC 43-116%) was reported for 2-fluorobiphenyl in SW-03. Since only one surrogate recovery was unacceptable in this analysis, no qualifiers were warranted.

Field Duplicates

Positive results for fluorene (0.2 μ g/L) and dibenzo(a,h)anthracene (0.3 μ g/L) were reported in SW-01 but were not confirmed in SW-10 (10 U for both analytes). Based on professional judgement, results for fluorene and dibenzo(a,h)anthracene in SW-01 were qualified as less than the CRQLs (10 U) due to this lack of confirmation.

Laboratory Fortified Blank

Recovery of 4-methylphenol (45%) was unacceptably low (QC 48-95%) in the laboratory fortified blank analysis associated with SW-09, SW-01, and SW-10. Results for 4-methylphenol in SW-09, SW-01, and SW-10 were qualified as estimated (UJ) on this basis.

Although acceptance limits of 0-25% were designated by the laboratory on the summary form in the data package, very poor recovery was demonstrated for benzoic acid in the laboratory fortified blank analysis associated with SW-09, based on the validator's professional judgment (2%). The result for benzoic acid in SW-09 was rejected (R) on this basis.

Recovery of pentachlorophenol (132%) was unacceptably high (QC 63-125%) in the laboratory fortified blank analysis associated with SW-09. Pentachlorophenol was not detected in the associated sample, and no action was taken based on the high recovery.

Recoveries of diethylphthalate (55%; QC 62-132%) and 4-methylphenol (45%; QC 48-95%) were unacceptably low in the laboratory fortified blank analysis associated with SW-02, SW-03, SW-05, and SW-07. Results for diethylphthalate and 4-methylphenol in SW-02, SW-03, SW-05, and SW-07 were qualified as estimated (J, UJ) on this basis.

The laboratory should investigate the poor laboratory fortified blank recoveries and implement appropriate corrective action. Poor recoveries in a blank spike analysis are indicative of a potentially serious problem in the analytical process.



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Mr. Larry McTiernan 5 July 2001 Page 6

Please contact the undersigned at (865) 966-8880 if you have any questions or need further information.

Very truly yours,

TRILLIUM, INC.

Carol A. Erikson

Quality Assessment Manager

Carol a Erikson

CAE/

Attachments: Table I: Recommendation Summary

Table II: Overall Evaluation of Data

Data Summary Key

Data Validation (DV) Worksheet

Data Summary Table

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TABLE I

INDUSTRI-PLEX SITE

STL Connecticut Report #7001-0698A

Recommendation Summary

Sample Nos.	Matrix	TCL SVOCs	Selected SVOCs
SW-09	AQ	$A^{1,2,3,4}, J^{1},$ R^{1}	NA
SW-01	AQ	NA	$A^{3,4,5}, J^1$
SW-10	AQ	NA	$A^{3,4}, J^1$
SW-02	AQ	NA	A^3 , J^2
SW-03	AQ	NA	$A^{3,4}, J^2$
SW-05	AQ	NA	J^2
SW-07	AQ	NΛ	$A^{3,4}, J^2$

AQ - aqueous

NA = not analyzed

- A¹ = Accept the results for the sample, but qualify the result for di-n-butyl phthalate as not detected (U) at the sample-specific CRQL based on method blank contamination.
- A² = Accept the results for the sample, but qualify the results for butylbenzylphthalate and dinoctylphthalate as not detected (U) at the sample-specific CRQL based on field blank contamination.
- A³ = Accept the results for the sample, but qualify the results for phenanthrene, fluoranthene, pyrene, chrysene, and bis(2-ethylhexyl)phthalate as not detected (U) at the sample-specific CRQL based on field blank contamination.
- A⁴ = Accept the results for the sample, but qualify the results for benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, indeno(1,2,3-cd)pyrene, and benzo(g,h,i)perylene as not detected (U) at the sample-specific CRQL based on field blank contamination.



- A⁵ = Accept the results for the sample, but qualify the results for fluorene and dibenzo(a,h)anthracene as less than the sample-specific CRQL (10 U) due to lack of confirmation in the field duplicate analyses.
- J¹ = Estimate (UJ) the results for 4-methylphenol due to an unacceptably low recovery in the associated laboratory fortified blank analysis.
- J² = Estimate (J, UJ) the results for diethylphthalate and 4-methylphenol due to unacceptably low recoveries in the associated laboratory fortified blank analysis.
- R^1 = Reject (R) the result for benzoic acid due to very poor recovery (<10%) in the associated laboratory fortified blank.

TABLE II

INDUSTRI-PLEX SITE

STL REPORT #7001-0698A

Overall Evaluation of Data

	Semivolatile Organic Compounds (SVOCs)										
DQOs (list all DQOs)	Sampling and/or Analytical Method Appropriate Yes or No	Measurement Error		Sampling Variability**	Potential Usability Issues						
		Analytical Error	Sampling Error*								
The DQO for this site is to collect data of sufficient quality to: 1. Allow a technically sound evaluation of sediment fate and transport, as well as impacts to surface water, in the Hall's Brook Holding Area (HBHA), located just downstream of the Industri-Plex site. 2. Determine if the HBHA sediments are being entrained and/or transported out of the HBHA during storm events. 3. Be representative of the actual site conditions and comparable to other data generated in support of this project.	Analytical Method: Yes SW-846 Method 8270C Sampling Method: Yes Grab	Refer to qualifications in Table I A ¹ J ¹ through J ² R ¹	None A ² through A ⁵		 Very poor recovery of benzoic acid in the laboratory fortified blank analysis renders results for this compound unusable. Results for several PAH and phthalate target analytes were qualified as less than the CRQLs due to blank contamination. Results for fluorene and dibenzo(a.h)-anthracene in SW-01 were qualified as less than the CRQLs due to lack of field duplicate confirmation. Results for 4-methylphenol in all samples and for diethylphthalate in four samples were estimated due to unacceptably low recoveries in the LFB analysis. 						

- * The evaluation of "sampling error" cannot be completely assessed in data validation.
- ** Sampling variability is not assessed in data validation.



DATA SUMMARY KEY ORGANIC DATA VALIDATION

- J = The associated numerical value is an estimated quantity.
- R = The data are unusable (compound may or may not be present). Resampling and reanalysis are necessary for verification. The R replaces the numerical value or sample quantitation limit.
- U = The compound was analyzed for, but not detected. The associated numerical value is the sample quantitation limit or the adjusted sample quantitation limit.
- UJ = The compound was analyzed for, but not detected. The associated numerical value is the estimated sample quantitation limit.

DATA SUMMARY TABLE - TCL SEMIVOLATILE ORGANICS I WATER SAMPLES (ug/L)

Site Name: Industri-Plex

STL Report #7000-0698A

	GW 60	en de la companya de la companya de la companya de la companya de la companya de la companya de la companya de	
Sample Number	SW-09		:
Lab ID	010698A-01		 ,
Dilution Factor*	1.00		
Date Sampled	23-Mar-01		
Date Extracted	27-Mar-01	·	
Date Analyzed	28-Mar-01		
CRQL**	<u> </u>		
10 Cyclohexanone			
10 Phenol			
10 bis(2-Chloroethyl)ether	<u> L</u>		
10 2-Chlorophenol			
10 1,3-Dichlorobenzene			
10 1,4-Dichlorobenzene			
10 Benzyl alcohol			
10 1,2-Dichlorobenzene	1 1		
10 2-Methylphenol			
10 bis(2-chloroisopropyl)ether			
10 4-Methylphenol	UJ		· — · ·
10 N-Nitroso-di-n-propylamine			
10 Hexachloroethane			
10 Nitrobenzene			
10 Isophorone	1		
10 2-Nitrophenol			
10 2,4-Dimethylphenol	+		
50 Benzoic acid	R		
10 bis(2-Chloroethoxy)methane	<u> </u>		
10 2,4-Dichlorophenol			
10 1,2,4-Trichlorobenzene	 	· · · · · · · · · · · · · · · · · · ·	
10 Naphthalene	 		
t replications			- · · - · - · · · ·

^{*} where applicable, includes adjustment for use of a sample volume slightly smaller than 1000 mL

[\]Roux SedTransport\0698SV

^{**} blank spaces mean the analyte was not detected; sample-specific CRQLs are equal to unadjusted CRQL times the DF

DATA SUMMARY TABLE - TCL SEMIVOLATILE ORGANICS 2 WATER SAMPLES (ug/L)

Site Name: Industri-Plex STL Report #7000-0698A

Sample Number	SW-09							. 		<u>-</u>	ļ	
Lab ID	010698A-01]i	
Dilution Factor*	1.00										·	
Date Sampled	23-Mar-01	. h					·		<u> </u>			
Date Extracted	27-Mar-01										li I	
Date Analyzed	28-Mar-01	i) 	
RQL++		1		·	<u></u>						<u> </u>	<u></u>
10 4-Chloroaniline												
10 Hexachlorobutadiene		<u>i</u>							<u> </u>			
10 4-Chloro-3-methylphenol					:			- -	· ·		1	
10 2-Methylnaphthalene											<u>.</u>	
10 Hexachlorocyclopentadiene	·						· · · · · · · · · · · · · · · · · · ·		<u> </u>	· - 	:	.
10 2,4,6-Trichlorophenol												
50 2,4,5-Trichlorophenol									<u> </u>	· · · · · · · · · · · · · · · · · · ·	<u>i </u>	:
10 2-Chloronaphthalene									! :			
50 2-Nitroaniline									<u></u>		·	. .
10 Dimethylphthalate	: :	_ <u>.</u>										
10 Acenaphthylene			· · · · · ·						· — · . — —		<u> </u>	
10 2,6-Dinitrotoluene	·										<u> </u>	
50 3-Nitroaniline	<u> </u>								i		·-• · ·	
10 Acenaphthene	<u> </u>						_ ,. ,	. 75	·		· · · · · · · · · · · · · · · · · · ·	
50 2,4-Dinitrophenol	<u>i</u>			<u>i</u>					<u>.</u> <u></u> .			· _
50 4-Nitrophenol								- 	: -	<u> </u>	· k	
10 Dibenzofuran	1			i					<u> </u>		- <u>-</u>	
10 2,4-Dinitrotoluene	i								·	.		
10 Diethylphthalate	0.2 j J					i						-4
10 4-Chlorophenyl-phenylether	. L											
10 Fluorene						:						
50 4-Nitroaniline						*	,					

^{*} where applicable, includes adjustment for use of a sample volume slightly smaller than 1000 mL

^{**} blank spaces mean the analyte was not detected; sample-specific CRQLs are equal to unadjusted CRQL times the DF

DATA SUMMARY TABLE - TCL SEMIVOLATILE ORGANICS 3 WATER SAMPLES (ug/L)

STL Report #7000-0698A Site Name: Industri-Plex

Sample Number	SW-09							
Lab ID	010698A-01					<u>.</u> j		
Dilution Factor*	1.00							
Date Sampled	23-Mar-01							
Date Extracted	27-Mar-01				· · · · · · · · · · · · · · · · · · ·		<u></u>	
Date Analyzed	28-Mar-01							
CROL**				——————————————————————————————————————		ļ	<u></u>	
50 4,6-Dinitro-2-methylphenol								
10 N-Nitrosodiphenylamine							·	
10 4-Bromophenyl-phenylether			,					
10 Hexachlorobenzene		· · · · · · · · · · · · · · · · · · ·				<u> </u>	<u> </u>	· ·
50 Pentachlorophenol							<u> </u>	·
10 Phenanthrene	10 U			***************************************		<u> </u>	1	
10 Anthracene	0.1 J	<u> </u>		e e e e				
10 Di-n-butylphthalate	10 : U				. #4	· · · · · · · · · · · · · · · · · · ·		····
10 Fluoranthene	10 U							
10 Pyrene	10 U					~_		
10 Butylbenzylphthalate	10 U							
20 3,3'-Dichlorobenzidine	<u>.</u>	· · -	 					
10 Benzo(a)anthracene	10 U							
10 Chrysene	10 U			<u>:</u> <u>-</u>		<u> </u>		
10 bis(2-Ethylhexyl)phthalate	10 U					: 		-
10 Di-n-octylphthalate	10 U			<u>:</u>			· • 	
10 Benzo(b)fluoranthene	10 U					1 1		
10 Benzo(k)fluoranthene	10 U		·					
10 Вепго(а)рутепе	10 U					·	·	
10 Indeno(1,2,3-cd)pyrene	10 U					·	= . <i>i</i>	-
10 Dibenz(a,h)anthracene						4		
10 Benzo(g,h,i)perylene	10 U							
* where applicable, includes adjustm	ent for use of a sample	volume slightly small	er than 1000 mL			\Roux SedTrai	nsport\0698SV	

^{*} where applicable, includes adjustment for use of a sample volume slightly smaller than 1000 mL

^{**} blank spaces mean the analyte was not detected; sample-specific CRQLs are equal to unadjusted CRQL times the DF

DATA SUMMARY TABLE - SELECTED SEMIVOLATILE ORGANICS WATER SAMPLES (ug/L)

Site Name: Industri-Plex

STL Report #7000-0698A

Sample Number	SW-01	SW-10	SW-02	SW-03	SW-05	SW-07		
Lab ID	010698A-02	010698-03	010698A-04	010698A-05	010698A-06	010698A-08		
Dilution Factor*	1.00	1.00	1.00	1,47	1.19	1.00		
Date Sampled	23-Mar-01	23-Mar-01	26-Mar-01	26-Mar-01	26-Mar-01	26-Mar-01		
Date Extracted	27-Mar-01	27-Mar-01	28-Mar-01	28-Mar-01	28-Mar-01	28-Mar-01		
Date Analyzed	28-Mar-01	28-Mar-01	03-Apr-01	03-Apr-01	03-Apr-01	03-Apr-01		
QL***								
10 Cyclohexanone					0.6 J	16		
10 4-Methylphenol	UJ	UJ_	ប្រ	UJ	UJ	UJ		
10 Naphthalene					<u> </u>			
10 2-Methylnaphthalene								
10 Acenaphthylene								
10 Acenaphthene								
10 Fluorene	10 U	<u> </u>				.,		
10 Diethylphthalate	0.2 J	0.2 J	17	ักา	UJ	0.3 J	<u> </u>	
10 Phenanthrene	· 10 U	10 U	10 U	10 U		IO U	· · · · · · · · · · · · · · · · · · ·	
10 Anthracene	0.3 J	0.2 J						
10 Fluoranthene	10 U	10 U	10_U	10 U		10 U		
10 Pyrene	10 U	10_C	10 U	10 U		10 U		
10 Benzo(a)anthracene	10 U	_10_U		10 U	<u></u>	10 U		
10 Chrysene	10 U	10 U	10 U	U :01		10 U		
10 bis(2-Ethylhexyl)phthalate	10 U	10_U	10 [†] U	10_U	!	10 U	: 	
10 Benzo(b)fluoranthene	10 U	_10 U	·	10 U		10 U		<u></u>
10 Benzo(k)fluoranthene	10 U	_10_U_		10 U		10 U		
10 Benzo(a)pyrene	10 U	10 U	· · · · · · · · · · · · · · · · · · ·	10 U		10 U	·	
10 Indeno(1,2,3-cd)pyrene	10 U	10 U		10 U		10 U		
10 Dibenzo(a,h)anthracene	10 U					0.4 J		
10 Benzo(g,h,i)perylene	10 U	10 U	1	10 U		10 U		
						1		

^{*} includes adjustments for sample volumes slightly larger or smaller than 1000 mL

[\]Roux SedTransport\0698SV2

^{***} blank spaces mean the analyte was not detected; sample-specific CRQLs are equal to unadjusted CRQL times the DF

Site Name	Industri-Ple	¥
Reference 1		

REGION I ORGANIC DATA VALIDATION

The following data package has been validated:	•
Lab Name STL Connecticut Case/Project No. SDG No. 1001-0698A No. of Samples/Matrix	SOW/Method No. EPA 8270C Sampling Date(s) 3 23 01 and 3 26 01 Shipping Date(s) 423 01 and 3 26 01 Date Rec'd by lab 3 24 01 and 3 27 01
Traffic Report Sample Nos. <u>SW-01, SW-</u> SW-10	02, 5W-03, 5W-05, 5W-07, 5W-09,
Trip Blank No. — Equipment Blank No. — Field Blank Bottle Blank No. — SW-01 SW-1D PES Nos. — SW-01 SW-1D	
The Region I. EPA-NE Data Validation Functional Gurevision 1996 was used to evaluate the data Functional Guidelines were used to evaluate the data an criteria from EPA approved QAPjP or amendment to a Tier II or Tier III evaluation was used to validate the partial Tier III was used, then identify samples, param	and/or approved modifications to the EPA-NE d are attached to this cover page: (attach modified QAPjP). Le data (circle one). If a Tier II validation with a eters, etc. that received partial Tier III validation
•	
The data were evaluated based upon the following part Overall Evaluation of Data Data Completeness (CSF Audit - Tier I) Preservation & Technical Holding Times GC/MS & GC/ECD Instrument Performance Check Initial & Continuing Calibrations Blanks Surrogate Compounds Internal Standards Matrix Spike/Matrix Spike Duplicate	Field DuplicatesSensitivity CheckPE Samples/Accuracy Check
Region I Definitions and Qualifiers:	
A - Acceptable Data J - Numerical value associated with compound is an R - The data are rejected as unusable. The R replaces U - Compound not detected at that numerical sample UJ - The sample quantitation limit is an estimated qua TB, BB, EB - Compound detected in aqueous trip bla blank associated with soil/sediment samples.	the numerical value or sample quantitation limit. quantitation limit. ntity.
Validator's Name <u>Carol ErikSon</u> Company Na	ame Fillium INC Phone Number 8 45 94 68 880
Date Validation Started 7/2/01	Date Validation Completed 4/5/01

COMPLETE SDG FILE (CSF) AUDIT

Organic Trac	tions: <u>510C</u>			-		
Missing Info			Contacted			
Raw Do	ta	accepto	rule to cl	ient -	no action	1 tak
					 	
· · · · · · · · · · · · · · · · · · ·						
					·····	
· · · · · · · · · · · · · · · · · · ·						
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	···					
		-				
<u> </u>				 		
Validator:	cae				Date: 7/2/	01

Data Validation Worksheet Cover Page - Page 2

Check if all criteria are met and no hard copy worksheet provided. Indicate NA if worksheet is not applicable to analytical method. Note: there is no standard worksheet for System Performance, however, the validator must document all system performance issues in the Data Validation Memorandum.

VO.	V2\A	worksh	eetc.
7 (7)		MOTIVOT.	CLLJ.

<u>VOA</u>	/SV worksheets:		
	VOA/SV-Pest/PCB VOA/SV-Pest/PCB-I VOA/SV-II VOA/SV-III VOA/SV-IV VOA/SV-Pest/PCB-V-A VOA/SV-Pest/PCB-V-B VOA-VI SV-VI VOA/SV-Pest/PCB-VIII VOA/SV-Pest/PCB-IX VOA/SV-Pest/PCB-X VOA/SV-Pest/PCB-XI VOA/SV-Pest/PCB-XII VOA/SV-Pest/PCB-XII VOA/SV-Pest/PCB-XIII VOA/SV-Pest/PCB-XIII VOA/SV-Pest/PCB-XIII VOA/SV-Pest/PCB-XIII VOA/SV-XIV VOA/SV-XV TABLE II-WORKSHEET	COMPLETE SDG FILE (CSF) AUDIT PRESERVATION AND HOLDING TIMES GC/MS INSTRUMENT PERFORMANCE CHECK (TUNING) INITIAL CALIBRATION CONTINUING CALIBRATION BLANK ANALYSIS BLANK ANALYSIS VOA SURROGATE SPIKE RECOVERIES SV SURROGATE SPIKE RECOVERIES INTERNAL STANDARD PERFORMANCE MATRIX SPIKE/MATRIX SPIKE DUPLICATE FIELD DUPLICATE PRECISION SENSITIVITY CHECK ACCURACY CHECK TARGET COMPOUND IDENTIFICATION SAMPLE QUANTITATION TENTATIVELY IDENTIFIED COMPOUNDS SEMIVOLATILE CLEANUP OVERALL EVALUATION OF DATA	NA NA NA NA NA
Pest/I	CB worksheets:		
	VOA/SV-Pest/PCB VOA/SV-Pest/PCB-I Pest/PCB-IIA Pest/PCB-IIB Pest/PCB-IIC Pest/PCB-III Pest/PCB-III Pest/PCB-III Pest/PCB-IV VOA/SV-Pest/PCB-V-A VOA/SV-Pest/PCB-V-B Pest/PCB-VI VOA/SV-Pest/PCB-VIII VOA/SV-Pest/PCB-IX VOA/SV-Pest/PCB-X VOA/SV-Pest/PCB-X VOA/SV-Pest/PCB-XI Pest/PCB-XII Pest/PCB-XIII VOA/SV-Pest/PCB-XIII TABLE II-WORKSHEET	COMPLETE SDG FILE (CSF) AUDIT PRESERVATION AND HOLDING TIMES GC/ECD INSTRUMENT PERFORMANCE CHECK- RESOLUTION GC/ECD INSTRUMENT PERFORMANCE CHECK- RETENTION TIMES GC/ECD INSTRUMENT PERFORMANCE CHECK- ACCURACY CHECK OF INITIAL CALIBRATION GC/ECD INSTRUMENT PERFORMANCE CHECK- PESTICIDE DEGRADATION INITIAL CALIBRATION CONTINUING CALIBRATION BLANK ANALYSIS BLANK ANALYSIS SURROGATE COMPOUNDS: SPIKE RECOVERIES AND RETENTION TIME SHIFT PESTICIDE CLEANUP MATRIX SPIKE/MATRIX SPIKE DUPLICATE FIELD DUPLICATE PRECISION SENSITIVITY CHECK ACCURACY CHECK COMPOUND IDENTIFICATION SAMPLE QUANTITATION OVERALL EVALUATION OF DATA	NA -

I certify that all criteria were met for the worksheets checked above.

Signature: Carola Eniksor	Name: Carol A. Erikson
Date: 7/5/01	

EPA-NE - Data Validation Worksheet VOA/SV - Pest/PCB-V-A

V. BLANK ANALYSIS

List the blank contamination below.

Concentration Level: Low

Contacted: Yes No Date:

Sampler: Martin Haines - 3 23 Company: Rowy

"LC/HT" - 3 76

1. Laboratory: Method, Storage and Instrument Blanks

Date Extracted	Date Analyzed	Parameter/ Matrix	Sample No. (Blank Type)	Instrument/ Column	Compound	Conc. (units)
3/27/01	3/28/01	SYLAD	SBLKNO	1+P59710 (DNBP	0.3 Mg/L
IV.	14.	11	l i	l)	BaEHP	0.7 Mg/L
3 28 01	4301	SVAQ	SBLKPQ	HP5971Q	38 P	0.1 ug/L
	· •					/)
		*				

2. Field: Equipment (Rinsate), Trip and Bottle Blanks

Date Extracted	Date Analyzed	Parameter/ Matrix	Sample No. (Blank Type)	Instrument/ Column	Compound	Conc. (units)
3/28/01	4/3/01	SV/AQ	FB	HP5971Q	phenanthrene	0.8 µg/L
					fluoranthene	1 uglL
			·		pyrene	0.9 491
					butylherzylphthalate	0.5 Mg/Le
					bergo(a) anthracene	0.3 mg/L)
			<u> </u>		chrysene_	0.5 WIL
					(BaEHP	3 ug/Es

Validator: (a Grik 50)

bergo(b)fluoranthene 0.6/49/1
bergo(K)fluoranthene 0.5/49/1
bergo(K)fluoranthene 0.5/49/1
bergo(a) pyrene 0.4/49/1

indeno(1,2,3-ed) pyrene 0.4 mg/L

3. Blank Actions - List the maximum concentrations of blank compounds.

Compound	Type of Blank	Date Blank Sampled/Originated	Max. Conc. (units)	Action Level (units)	Sample QL	Samples Affected	Action
phenanthrene	Field	3/24/01	0.8 Mg/L	4.0 ugll	10	5w-09 -01,-10,-02,03,-0	
fluoranthene			1	5.0		500-09,-01,-10,-02,-03,-0	
pyrene			0.9	4.5		5W-09,-01,-10,-02,-03,-0	2 U
BBP			0.5	525 700		5W-09.	и
bengo (a) anthr-	}		0.3	1.5		SW-09,-01,-10,-03,-07	и
Chrysene			0.5	2.5		54-09,-01,-10,-02,-03,-07	И
BaEHP			3	1530 WE	4701	5W-09,-01,-10,-02,-03,-07	и
DNOP			11	55 IV		5W-09.	Ц
bengo (b) Augranth-	-	•	0.6	3.0		5W-09,-01,-10,-03, -07	и
benes (K) fluoranth-	-		0.5	2.5		5W-09,-01,-10,-03,-07	и
beno (a) pyrene			0.4	2.0		5W-09,-01,-10,-03,-07	и
indered 1,2,3-ca) our -			0.4	2.0		5w-09-01,-10,-03,-07	Ц
berso (gli) perujere	4	4	0.4	20 1	→	50-09-01,-10,-03,-07	Ц
benzo (giri) pery lene DNBP	Mathod	3/27/01	0.3 ugil	H53:UGIL Caeaptol	10	5w-09	и
		1 1		caealatol			
		-		-			

Comments:	
17 11 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
Validator: Calaikbor	Date: 7/2/0/

VI. SV SURROGATE SPIKE RECOVERIES - List all surrogate compound recoveries that are outside method QC acceptance criteria.

		Bas	e/Neutral Method Q	C Acceptance Criter	ria	
Method	NBZ-d _s	2-FBP	ТРП-d ₁₄	1,2-DCB-d ₄ *	Other:	
OLM03.2	Water Soil 35-114 23-120	<u>√Water Soil</u> 43-116 30-115	<u>Water Soil</u> 33-141 18-137	Water Soil 16-110 20-130		
OLC02.1	40-110	30-110	20-140	NΛ		
Other:	43-116					
Sample Number/Matrix	% Recovery	% Recovery	% Recovery	% Recovery	% Recovery	Action
5W-03 /AQ	40_	40				none
		1				
Method	Phenol-d	2.EP	Acid Method QC Ac		Other	
Method OLM03.2	Phenol-d ₅ <u>Water Soil</u> 10-110 24-113	2-FP <u>Water Soil</u> 21-110 25-121	2,4,6-TBP	2-CP-d ₄ *	Other:	
	Phenol-d, Water Soil 10-110 24-113 15-115	2-FP <u>Water Soil</u> 21-110 25-121 15-110		2-CP-d ₄ * <u>Water Soil</u> 33-110 20-130	Other:	
OLM03.2	<u>Water</u> <u>Soil</u> 10-110 24-113	<u>Water</u> <u>Soil</u> 21-110 25-121	2,4,6-TBP <u>Water Soil</u> 10-123 19-122	2-CP-d ₄ *	Other:	
OLM03.2 OLC02.1	<u>Water</u> <u>Soil</u> 10-110 24-113	<u>Water</u> <u>Soil</u> 21-110 25-121	2,4,6-TBP <u>Water Soil</u> 10-123 19-122	2-CP-d ₄ * <u>Water Soil</u> 33-110 20-130	Other:	Action
OLM03.2 OLC02.1 Other:	Water Soil 10-110 24-113 15-115	<u>Water Soil</u> 21-110 25-121 15-110	2,4,6-TBP <u>Water Soil</u> 10-123 19-122 15-130	2-CP-d ₄ * <u>Water Soil</u> 33-110 20-130 NA		Action
OLM03.2 OLC02.1 Other:	Water Soil 10-110 24-113 15-115	<u>Water Soil</u> 21-110 25-121 15-110	2,4,6-TBP <u>Water Soil</u> 10-123 19-122 15-130	2-CP-d ₄ * <u>Water Soil</u> 33-110 20-130 NA		Action
OLM03.2 OLC02.1 Other:	Water Soil 10-110 24-113 15-115	<u>Water Soil</u> 21-110 25-121 15-110	2,4,6-TBP <u>Water Soil</u> 10-123 19-122 15-130	2-CP-d ₄ * <u>Water Soil</u> 33-110 20-130 NA		Action
OLM03.2 OLC02.1 Other:	Water Soil 10-110 24-113 15-115	<u>Water Soil</u> 21-110 25-121 15-110	2,4,6-TBP <u>Water Soil</u> 10-123 19-122 15-130	2-CP-d ₄ * <u>Water Soil</u> 33-110 20-130 NA		Action
OLM03.2 OLC02.1 Other:	Water Soil 10-110 24-113 15-115	<u>Water Soil</u> 21-110 25-121 15-110	2,4,6-TBP <u>Water Soil</u> 10-123 19-122 15-130	2-CP-d ₄ * <u>Water Soil</u> 33-110 20-130 NA		Action

^{*} Advisory Surrogates - OLM03.2

Validator: CAGUKSOT

Date: 7/2/01

EPA-NE -	Data	Validation	Worksheet
VOA/SV -	Pest	/PCB-IX	

IX. FIELD DUPLICATE PRECISION - List all field duplicate analytes that are outside criteria.

Use a separate worksheet for each field duplicate pair.

Sample Number $\underline{5W-01}$ Duplicate Sample Number $\underline{5W-10}$

Matrix <u>AQ</u>

Parameter	Compound	Sample			Duplicate _	Duplicate QL		RPD	QC Acceptance	Action
· · · · · · · · · · · · · · · · · · ·		Conc.	SQL	2xSQL	Conc.	SQL	2xSQL		Criteria RPD or NA*	
5V.	Fluorene	0.2 uall	- 10	20	ND	10_	20		NA	U ecral
	DEP	0.2 ugl			0.2491			Ø		now
	Anthracene	03 MIL			0.2 Mall			40		none
d	benzo (ah) gathracene	0.3/15/1			QN C				NA	U@ceo
		٠,٠								
			-							
								i		
			-				-			
					!					

* For instances where of	one duplicate result is ND (or reported less the	an the sample Q	L).	
Does the MS/MSD data indi	cate acceptable laboratory precision?		Y N	
Comments:				
Sampler Name:	Contractor Name:		Date Contacted:	
Reason for Contact and resol	ution obtained:			
Validator: <u>COE</u>		Date: _	7/2/01	

EPA-NE - Dat VOA/SV - Pes	ta Validation Wo st/PCB-X	rksheet	<u> </u>				
X. SENSITIV	VITY CHECK	(Method D	Detection Limit S	tudy)			
List all	compounds, suri	rogates, an	d internal standare	ds that are outside th	he MDL crite	eria.	
 Date of 	Preparation/Anament I.D.:	alysis: / Same as	en submitted with Within 1 yes s samples? s samples?	seven replicates for ar?	each compo	und and matrix o	f interest? Y N Y N Y N Y N Y N
Matrix	Compound	MDL > QL	Method QC Limits < 80% or > 120%	IS Outside Area Count and/or RT Criteria	RSD > 20%	Samples Affecte	d Action
							
					-		
	•	·	•	results to evaluate surrogates and interi		that are outside o	riteria
•	•			ed at the proper frequency (act the proper frequency) (vendor) independen			_
Matrix SBUK NQ	Compoun - ex3\2701		Method QC Limits < 60% or > 140% Other:	IS Outside Area Count and/or RT Criteria	Samı	ples Affected	Action
AQ	4-MP		45% (ac 48-		5W-09	,-01,-10	иJ
	benjoic as		0% (000-		SW-09		R Name
	PCP		132% (QC 63	-12590)	<u>5w-09</u>		None_
 	 			 	 -		

Validator: <u>Cae</u> Date: <u>7/2/01</u>

EPA-NE -	Data	Validation	Worksheet
VOA/SV -	Pest.	/PCB-X	

Χ.	SENSITIVITY	CHECK	(Method	Detection	Limit	Study)
----	-------------	-------	---------	-----------	-------	--------

List all compounds, surrogates, and internal standards that are outside the MDL criteria.

•	Has an appropriate MDL study been submitted with seven replicates for each compound and matrix of interest?	Y	N
•	Date of Preparation/Analysis: Within 1 year?	Y	N
•	Instrument I,D.: Same as samples?	Y	N
•	Column I.D.: Same as samples?	$\bar{\mathbf{Y}}$	N

Matrix	Compound	MDL > QL	Method QC Limits < 80% or > 120%	IS Outside Area Count and/or RT Criteria	RSD > 20%	Samples Affected	Action
/	1						

If an MDL study has not been submitted, use only the LFB results to evaluate data.

(Laboratory Fortified Blank) - List all LFB compounds, surrogates and internal standards that are outside criteria.

Has an appropriate and complete LFB been submitted at the proper frequency?

Does it contain all target compounds at the method-required QLs?

Was the LFB spiked with a standard from a source (vendor) independent of the calibration standard?

Matrix 5BUK PQ -	Compound LY 3 28 01	Method QC Limits < 60% or > 140% Other:	IS Outside Area Count and/or RT Criteria	Samples Affected	Action
AQ	DEP	55% (ac 62-	132 %)	SW-01,-10,-02,-03,-0	5,-07 J,W
	4MP	45% (QC 48	-9570)	SW-01 - 100 -02 -03-0	5,-07 UJ
	(remaining compo	s "out" were r	ot reported in	associd samples =	> no action)

	<u> </u>	· 	<u> </u>			
Validator:	19E			Date: _	7/2/01	

Spring Storm 2A



356 FARRAGUT CROSSING DR. KNOXVILLE, TN 37922

(423) 966-8880 FAX (423) 966-8885 cerikson@trilliuminc.com

September 5, 2001

Mr. Larry McTiernan Roux Associates, Inc. 25 Corporate Drive Suite 230 Burlington, MA 01803

Subject:

STL Connecticut Report No. 7001-0741A

Downgradient Transport (Surface Water and Sediments) Investigation

Industri-Plex Site

Woburn, Massachusetts

Total TAL Metals: 2/Surface Water/SW-04, SW-09

1/Field Blank

Selected Total Metals: 7/Surface Waters/SW-01, SW-02, SW-03, SW-05,

SW-06, SW-07, SW-10

(Field Duplicates: SW-01/SW-10)

Dissolved Arsenic: 7/Surface Waters/SW-01, SW-02, SW-04, SW-06, SW-07,

SW-09, SW-10

(Field Duplicates: SW-01/SW-10)

1/Field Blank

Total Suspended Solids: 9/Surface Waters/SW-01, SW-02, SW-03, SW-04,

SW-05, SW-06, SW-07, SW-09, SW-10

(Field Duplicates: SW-01/SW-10)

0/Field Blank

Dear Mr. McTiernan:

A Tier II validation was performed on the inorganic analytical data for two surface water samples collected by Roux Associates, Inc., at the Industri-Plex Site in Woburn, Massachusetts. Several additional samples were also reported in this data package, but, per project specifications, only the results for SW-04 and SW-09 were validated. The samples were analyzed according to EPA Methods 6010B/7470A, as applicable, for metals and EPA Method 160.2 for TSS. For SW-04 and SW-09, the full TAL (target analyte list, per the Contract Laboratory Program) was reported for the total metals fractions and arsenic only was reported for the dissolved fractions.

HOME OFFICE:

28 GRACE'S DRIVE • CDATESVILLE, PA19320 • (610) 383-7233 • FAX (610) 383-7907 OFFICES IN:



Mr. Larry McTiernan 5 September 2001 Page 2

The data were evaluated as Tier II level in accordance with the "Region I Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses" dated June 13, 1988, and the project-specific Quality Assurance Project Plan (QAPP). The evaluation was based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues.
- Data Completeness.
- Preservation and Technical Holding Times.
- * Instrument Calibration.
- Contract Required Detection Limit (CRDL) Standards.
 - Blanks.
- Inductively Coupled Plasma (ICP) Interference Check Samples.
- Matrix Spike (MS).
 - Laboratory Duplicates.
- * Field Duplicates.
- Laboratory Control Sample.
 - ICP Serial Dilution Analysis.
 - Detection Limit Results.
- NA PE Samples/Accuracy Check.
 - Sample Quantitation
- * = All criteria were met for this parameter.
- NA = Not Applicable.

Note: Worksheets for QC parameters that met criteria or are not applicable to the method will not be included as attachments to this document.

Table I summarizes the validation recommendations which were based on the following information. Table II summarizes the overall evaluation of the data with reference to the data quality objectives (DQOs) and potential usability issues.

Overall Evaluation of Data and Potential Usability Issues

Metals

The DQO for this site is to collect data of sufficient quality to allow a technically sound evaluation of sediment fate and transport, as well as impacts to surface water, in the Hall's Brook Holding Area (HBHA), located just downstream of the Industri-Plex site. The primary intended use for the data is to determine if the HBHA sediments are being entrained and/or transported out of the HBHA during storm events. The primary analytical objective is that measurements be representative of the actual site conditions and that data resulting from field sampling and analysis activities be comparable.



Mr. Larry McTiernan 5 September 2001 Page 3

Sample results for metals were qualified as the result of measurement error, which includes both analytical (laboratory) error and sampling (field) error. Measurement error associated with analysis includes laboratory blank contamination, lack of laboratory duplicate confirmation for selenium, and unacceptable serial dilution results for iron and potassium. Major impacts on data usability include:

- Results for cobalt in SW-04 and SW-09 were qualified as less than the reported values
 (U) based on calibration blank contamination.
- Results for chromium and iron in SW-04 and SW-09 were qualified as less than the reported values (U) based on preparation blank contamination.
- The result for selenium in SW-04 was qualified as less than the reported value (U) due to lack of confirmation in the laboratory duplicate analysis.

Measurement error associated with sample collection includes field blank contamination. Major impacts on data usability include:

 Results for barium, calcium, copper, magnesium, manganese, potassium, sodium, vanadium, and zinc in SW-04 and SW-09 were qualified as less than the reported values (U) due to field blank contamination.

Total Suspended Solids (TSS)

All quality control criteria were met for the TSS analyses of these samples.

Data Completeness

No chain of custody records and no laboratory receipt records were included in the data package. The laboratory was contacted on 8/6/01 and asked to provide this documentation. On 8/15/01, the laboratory indicated that they were having difficulty locating the missing documentation and agreed to keep looking until they had exhausted all reasonable possibilities. On 8/30/01, after looking through a box of data retrieved from storage, they concluded the missing documentation had been misfiled and could not be found. While the absence of these records does not directly affect the validity of the analytical data generated, it does make it impossible to verify sample integrity from "cradle to grave," and would be problematic if the data were to be used in litigation. As an alternative, the following documentation was provided by the client: (1) copies of the chain of custody records prior to shipment of the samples to the laboratory; (2) copies of the three FedEx airbills used to ship the samples to the laboratory; and (3) print-outs of the FedEx on-line tracking/delivery information for each airbill. These chain of custody records verify collection of the samples. The airbills document shipment to the laboratory, although the absence of the airbill numbers on the chain of custody records substantially weakens this link. The on-line tracking print-outs verify



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delivery of the three shipments to the laboratory. Each was signed for by "A. Yowocoski." Based on clarification requested from P. Hobart at STL, this is the name of a person working in STLs sample receiving department and is correctly spelled "Yawarowski." Both client identifications and laboratory identifications are present on the Inorganic Analysis Data Sheets (Form Is) in the data package and on the "Sample Summary" listing on page 18 of the data package. These records provide the best available documented link between the samples sent to the laboratory and the results ultimately reported. The chain of custody records, airbill copies, and on-line tracking information copies were added to the data package as pages 19a through 19h by the validator. The data user is cautioned that while this is the best documentation available to verify sample integrity, it falls well short of ideal and would still very likely be problematic if the data were to be used in litigation.

Sample preservation with nitric acid could also not be verified by the validator due to the lack of sample receipt documentation. For the purposes of this evaluation, it was assumed that all samples were properly acidified to pH<2 based on Roux's policy of using only pre-preserved sample containers prepared by the laboratory.

Form 2B in the data package received for review contained incorrect true values for arsenic, lead, and selenium. The laboratory was notified of the apparent discrepancies on 8/7/01 and provided a corrected summary form on that same date. The corrected form was inserted into the data package as page 48 by the validator, replacing the originally provided page.

The instrument detection limit summary (Form 10) for instrument JA61 post-dated the analyses performed on this instrument and reported in this data package. The laboratory was notified of the discrepancy on 8/6/01 and provided a corrected Form 10 on 8/31/01. The corrected form was inserted into the data package as page 62 by the validator, replacing the originally provided page.

No raw data were included in the data package. This is inconsistent with Region I guidelines, which specify that full Tier III deliverables are to be provided for all data packages no matter what level of validation is to be performed. However, the lack of raw data is acceptable to the client and does not adversely affect the Tier II validation effort. Therefore, no further action was taken on this basis.

Blanks

The following analytes were detected in associated blanks:

Analyte	Type of Blank	Maximum Concentration	Action Level	Action
Aluminum	Field	41.7 μg/L	209 μg/L	None
Antimony	Calibration	1.9 μg/L	9.5 μg/L	None
Barium	Field	8.9 μg/L	44.5 μg/L	U



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STL Connecticut Report #7001-0741A

Page 5

Analyte	Type of Blank	Maximum Concentration	Action Level	Action
Calcium	Field	14,800 μg/L	74,000 μg/L	U
Chromium	Preparation	1.4 μg/L	7.0 μg/L	U
Cobalt	Calibration	0.70 μg/L	3.5 μg/L	υ
Соррег	Field	3.9 μg/L	19.5 μg/L	U
Iron	Preparation	274 μg/L	1370 μg/L	U
Magnesium	Field	2,510 μg/L	12,550 μg/L	U
Manganese	Field	35.6 μg/L	178 μg/L	U
Potassium	Field	1,560 µg/L	7,800 μg/L	Ŭ
Sodium	Field	23,000 μg/L	115,000 μg/L	U
Thallium	Calibration	9.0 μg/L	45.0 μg/L	None
Vanadium	Field	0.44 μg/L	2.2 μg/L	U
Zinc	Field	53.8 μg/L	269 μg/L	U

Aluminum was present in both samples at concentrations exceeding the action limit for this analyte; therefore, no qualifiers were warranted for aluminum based on blank contamination.

Antimony and thallium were not detected in either sample; therefore, no qualifiers were warranted for these elements based on blank contamination.

Results for barium, calcium, chromium, cobalt, copper, iron, manganese, magnesium, potassium, sodium, vanadium, and zinc in SW-04 and SW-09 were qualified as less than the reported values (U) based on blank contamination.

Laboratory Duplicates

Selenium was reported in SW-04 at a very low concentration (3.0 μ g/L) but was not detected (2.6 U) in the laboratory duplicate analysis of this sample. The result for selenium in SW-04 was qualified as less than the reported value (U) based on this lack of duplicate confirmation.

Serial Dilution

Serial dilution results for iron (141%) and potassium (20%) were more than 10% different from the original, undiluted analysis results. Since the %Ds exceeded 15%, results for iron and potassium in SW-04 and SW-09 were qualified as estimated (J) on this basis, per Region I guidelines.



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Detection Limit Results

Instrument detection limits (IDLs) on Form 10 (instrument JA61) in the data package did not match the IDLs reported for undetected analytes in the samples. The Form 10 was also dated 4/17/01, which is after the reported total metals analyses were performed on this instrument. The laboratory was contacted on 8/6/01 and again on 8/28/01 and asked to clarify this discrepancy. A hand-corrected Form 10 was provided via facsimile on 8/31/01, with the date changed to 1/17/01.

Sample results reported for undetected target analytes were consistent with the hand-corrected IDLs provided by the laboratory on 8/31/01.

Sample Quantitation

The following validated dissolved results for arsenic were greater than validated total results for arsenic:

Sample	Total As (μg/L)	Dissolved As (μg/L)	%Difference	Action
SW-04	6.0	7.1	18.3%	J

Because the percent difference is greater than 10%, results for total and dissolved arsenic in SW-04 were qualified as estimated (J) based on the discrepancy between the measured total and dissolved concentrations

Results for cadmium in SW-04 and for selenium and silver in SW-09 were qualified as estimated (J) because they are less than twice the applicable instrument detection limit and were not otherwise qualified. All "B" flags applied by the laboratory to sample results below the applicable CRDL were removed.



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Please contact the undersigned at (865) 966-8880 if you have any questions or need further information.

Very truly yours,

TRILLIUM, INC.

Carol A. Erikson

Quality Assessment Manager

Carol Erifson

CAE/psn #00662

Attachments: Table I: Recommendation Summary

Table II: Overall Evaluation of Data

Data Summary Key Data Summary Tables

Data Validation (DV) Worksheets

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TABLE I

INDUSTRI-PLEX SITE

STL Connecticut Report #7001-0741A

Recommendation Summary

Sample Nos.	Matrix	Total TAL Metals	Dissolved Arsenic	TSS
SW-04	AQ	A ^{1,2} , J ^{1,2,3}	J^2	A
SW-09	AQ	$A^{1}, J^{1,4}$	A	A

AQ - aqueous

- A = Accept the results for the sample.
- A¹ = Accept the results for the sample, but qualify the positive results for barium, calcium, chromium, cobalt, copper, iron, manganese, magnesium, potassium, sodium, vanadium, and zinc as not detected (U) due to blank contamination.
- A^2 = Accept the results for the sample, but qualify the positive result for selenium as not detected (U) due to lack of confirmation in the laboratory duplicate analysis.
- J¹ = Estimate (J) the results for iron and potassium due to unacceptable serial dilution analysis results.
- J^2 = Estimate (J) the results for total and dissolved arsenic based on a discrepancy between the measured total and dissolved concentrations.
- J^3 = Estimate (J) the result for cadmium because it is less than twice the applicable instrument detection limit and was not otherwise qualified based on the validation effort.
- J^4 = Estimate (J) the results for selenium and silver because they are less than twice the applicable instrument detection limits and were not otherwise qualified based on the validation effort.

TABLE II

INDUSTRI-PLEX SITE STL REPORT #7001-0741A Overall Evaluation of Data

Total TAL Metals, Selected TAL Metals, Dissolved Arsenic, and Total Suspended Solids								
DQOs (list all DQOs)	Sampling and/or Analytical Method Appropriate Yes or No	Measuren	nent Error	Sampling Variabilit y**	Potential Usability Issues			
		Analytical Error	Sampling Error*					
The DQO for this site is to collect data of sufficient quality to: 1. Allow a technically sound evaluation of sediment fate and transport, as well as impacts to surface water, in the Hall's Brook Holding Area (HBHA), located just downstream of the Industri-Plex site. 2. Determine if the HBHA sediments are being entrained and/or transported out of the HBHA during storm events. 3. Be representative of the actual site conditions and comparable to other data generated in support of this project.	Analytical Method: Yes SW-846 Methods 6010B (metals), 7471A (mercury) and 160.2 (TSS) Sampling Method: Yes Grab	Refer to qualifications in Table I A ^{1,2} J ^{1,2,3,4}	Refer to qualifications in Table I A ¹		 Results for barium, calcium, chromium, cobalt, copper, iron, manganese, magnesium potassium, sodium, vanadium, and zinc in both samples were qualified as less than the reported values due to blank contamination. The result for selenium in SW-04 was qualified as less than the reported value due blank contamination. Results for iron and potassium in both samples were estimated due to unacceptable serial dilution results. Results for total and dissolved arsenic in SW-04 were estimated due to a discrepancy between the measured total and dissolved concentrations. Results for cadmium in SW-04 and for selenium and silver in SW-09 were estimated because they are less than 2x1DL. 			

The evaluation of "sampling error" cannot be completely assessed in data validation. Sampling variability is not assessed in data validation.



DATA SUMMARY KEY INORGANIC DATA VALIDATION

- J = The associated value is an estimated quantity.
- R = The data are unusable. (Note: Analyte may or may not be present).
- U = The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.
- UJ = The material was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

DATA SUMMARY FORM: TOTAL TAL METALS WATER SAMPLES (ug/L)

	Site Name: Inc	dustri-Plex					S	TL Report No.	7001-0741A		
profession for	Sample Number	SW-04	SW-09			_,				,	
	Lab ID	T010741A-08	T010741A-09	- :	** "						
	Date Sampled	29-Mar-01	29-Mar-01			v · ••	_				
_CRDL									'' 		
200	Aluminum	255	364								
60	Antimony	1.5 U	1.5 U			·· ·	,		<u> </u>		
10	Arsenic	6.0 J	7.2						· · · · · · · · · · · · · · · · · · ·	· · : :	
200	Barium	25.0 U	28.5 U								
5	Beryllium	0.10 U	0.10 U		,		,				
5	Cadmium	0.49 J	0.30 U	<u> </u>							
5000	Calcium	25900 U	25500 U				i	,			
10	Chromium	4.1 U	3.3 U				· 	· :			
50	Cobalt	1.2 U	1.2 U					. :	i	 	
25	Соррег	13.6 U	12.4 U					1		· · · · · · · · · · · · · · · · · · ·	
100	[ron	881 UJ	1180 UJ	i			, ,		; ;		
3	Lead	6.0	3.3			,					**
5000	Magnesium	3720 U	_4060 U			,					
15	Manganese	163 U	170 U								
0.2	Mercury	0.10 U	0.10 U					- · · ·			<u> </u>
40	Nickel	3.3	2.2								,
5000	Potassium	5100 UJ	5120 UJ					,	 		
5	Selenium	3.0 U	2.7 J				, ,=	1	:		
10	Silver	0.40 U	0.51 J								
5000	Sodium	57900 U	63400 U								
10	Thallium	8.2 U	8.2 U			:				· · · · · · · · · · · · · · · · · · ·	<u>. </u>
50	Vanadium	0.87 U	1.3 U	i							
20	Zinc	. 193 U	202 U	: 							•
	· · · ·		-··		•		• •		\Rou	SedTransport\0741	in

DATA SUMMARY FORM: SELECTED DISSOLVED METAL WATER SAMPLES

(ug/L)

Site Name: Industri-Plex					STL Report No. 7001-0741A											
	Sample Number	SW-04		7-09							·					
	Lab ID	F010741A	-08 F01074	41A-09												
	Date Sampled	29-Mar-0	01 29-M	1ar-01								_		· · · · · · · · · · · · · · · · · · ·		
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CRDL									·					<u> </u>		
10	Arsenic	7.1	J 4	1.2 U	·								i_	<u></u>	-	<u> </u>
																
											_:		· - :	<u>:</u>		
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DATA SUMMARY FORM: TOTAL SUSPENDED SOLIDS WATER SAMPLES (mg/L)

				(11)	(<u>8</u> L)					
Site Name: Industri-Plex			STL Report No. 7001-0741A							
Sample Number	SW-04	SW-09					. ·-		= `	
Lab ID	010741A-08	010741A-09			•	• •				
Date Sampled	29-Mar-01	29-Mar-01								
·		.,								
						**			:	
CRDL						• •				
A A TSS	7.2	14.4	-	e				 	· • • • • • • • • • • • • • • • • • • •	
5.0 TSS		14,4								
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REGIO	N I	
Data	Review	Worksheets

Site Name	Industri-Plex
Reference	Number

REGION I REVIEW OF INORGANIC CONTRACT LABORATORY DATA PACKAGE

Trillium. Inc.	
The hardcopied (laboratory name) <u>STL Connect</u> at Region I has been reviewed and the qualidata summarized. The data review included:	ty assurance and performance
SDG. No. Matrix AQ Ship	ling Date(s) 3/24/01 ping Date(s) Rec'd by Lab 4/3/01
Traffic Report Nos: SW-01, SW-02, S SW-09	
Equipment Blank No.: Field Blank Field Dup Nos: SW-01/SW-10	
Field Dup Nos: <u>5w-01/5w-10</u>	
EPA (0010B) 7470A, 100.2 SOW No. requires that specific analassociated reports be provided by the laborate, and SMO. The general criteria used to debased on an examination of:	ratory to the Regions, EMSL-
	ield Duplicates ab Control Sample Results
	urnace AA Results
-Blanks -I	CP Serial Dilution Results
	etection Limit Results ample Quantitation
-Laboratory Duplicates	•
Overall Comments: Tier I evaluation	1 - SW-04 and SW-09 only
Definitions and Qualifiers:	
 A - Acceptable data. J - Approximate data due to quality contr R - Reject data due to quality control or U - Analyte not detected. 	
Reviewer: Carola Erikson	Date: 8/28/01

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I. DATA COMPLETENESS

MISSING INFORMATION	DATE LAB CONTACTED	DATE REC'D
raw data	OK with client-	no action
COC, lab receipt records	8/4/01	*
Form 10 (IDLS) applicable to 4/12/01 analyses on JAle 1	8/4/01 48/85/01	8/31/01
to 4/12/01 analyses on JACE 1		
	· · · · · · · · · · · · · · · · · · ·	

* coc and lat receipt records for this data set could not be located by the laboratory. Requested and received from client: (1) copies of cocs prior to shipment to lat; (2) copies of FedEx auribills; (3) FedEx delivery/tracking documentation. Also regievoled copies of fuel logs showing acidification of sp1s for metals of fuel logs showing acidification of sp1s for metals analysis with HNO3, but this was not recorded. Assumed appropriate preservation per company policy of Using only pre preserved confainers provided by the lat.

IV A. BLANK ANALYSIS RESULTS (Sections 1-3)

List the blank contamination in Sections 1 & 2 below. A separate worksheet should be used for soil and water blanks.

1. Lab	oratory Blanks	•		MATRIX: AC	
DATE	ICB/CCB#	PREP BL	ANALYTE	CONC, /UNITS	
4/12/01	ICB, CCB3,	cc <u>84 –</u>	Ba	0.1,0.1,0.2 uglL	
	ICB, CCB1, CCB	66	Ca	45.5,22.8,7.7 ug/L	
	ICB, CCB1, CCB	54	Co	0.6,0.5(0.7 Mall)	
	ICB, CCB4	PBW	Mn	0.1,0.4, 3.078 Mg	11
	ICB, CCB3		Na	7.2,8.9 uglL	
4	ICB, CCBI		Zn	9.8, 1.6 Jug/L	

2. Equipment/Trip Blanks

DATE	EQUIP BL#	ANALYTE	CONC. /UNITS
3/29/01	Field Blank	Al	41.7 Mg/L
		Ba	8.9 ug/L ·
		Ca	14,800 ug/L
		<u>Cr</u>	0.98 ug/L
		Cu	3.9 ug/L
↓	₹.	Fe	216 MgTL
3. Freq	quency Requirements		· ''_

- - Was a preparation blank analyzed for each matrix, for every 20 samples and for each digestion batch?

Was a calibration blank run every 10 samples or every 2 hours whichever is more frequent?

If No.

The data may be affected. Use professional judgement to determine the severity of the effect and qualify the data accordingly. Discuss any actions below, and list the samples affected.

PART GUNTANTAL

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IV A. BLANK ANALYSIS RESULTS (Sections 1-3)

List the blank contamination in Sections 1 & 2 below. A separate worksheet should be used for soil and water blanks.

1. La	aboratory Blanks			MATRIX: AQ
DATE	ICB/CCB#	PREP BL	ANALYTE	CONC, /UNITS
4/12/01	CCB1, CCB4, CCB5, C	1866 -	(5b)	1.6, 1.5, 1.7(1.9 Mg/L)
	ccbl, ccbb		Mg_	11.9,14.9 ugIL
	ccb2, ccb3, 4,5	5,6 -	_K	39.6,42.0,52.4, 40.6,50.
	ccb2	_ -	Tl	9.0 Mg/L Mg/l
	ccb6		Al	26.0 reg/L
		PBW	Cr	1,413 Mg/L
7. Eq	uipment/Trip Bl	PBW anks	Fe	273.714 Mg/L
DATE	EQUIP BL#		ANALYTE	_conc,/units
3/29/01	Field Blank	_ /_	Mg	2510 µg/L
		_ /_	Mn	35.6 ug/L
		_	<u> </u>	1560 lig /L
			Na	23000 ug/L
<u></u>		_ \ _	<u>V</u>	0.44 Mg/L
	\downarrow		Zn	53.8 Mg/L
3. Fr	equency Requirem	ents `		

A. Was a preparation blank analyzed for each matrix, for every 20 samples and for each digestion batch?

Yes or No

B. Was a calibration blank run every 10 samples or every 2 hours whichever is more frequent?

Yes or No

If No,

	The	data	may	рe	aff,	ecte	đ.	Use prof	essi	onal	judgement	to	determine
											according	jly.	Discuss
апу	acti	ons	belov	v, a	nd 1	list	the	samples	affe	cted.			÷ ∸

REGION I Data Review Worksheets

IV B. BLANK ANALYSIS RESULTS (Section 4)

4. Blank Actions

The Action Levels for any analyte is equal to five times the highest concentration of that element's contamination in any blank. The action level for samples which have been concentrated or diluted should be multiplied by the concentration/dilution factor. No positive sample result should be reported unless the concentration of the analyte in the sample exceeds the Action Level (AL). Specific actions are as follows:

- 1. When the concentration is greater than the IDL, but less than the Action Level, report the sample concentration detected with a U.
- 2. When the sample concentration is greater than the Action Level, report the sample concentration unqualified.

Cr PB 1.4 ug/L 7.0 ug/L K FB 1500 ug/L 7800 ug/L Co CB 0.7 ug/L 3.5 ug/L Na FB 23,000 ug/L 115,000 ug/L Cu FB 3.9 ug/L 19.5 ug/L V FB 0.44 ug/L 2.2 ug/L	MATRIX: AQ	matrix: AQ
Co FB 14,800 ugil 74,000 ugil Mg FB 2510 ugil 12,550 ugil Cr PB 1.4 ugil 7.0 ugil K FB 1520 ugil 7800 ugil Co CB 0.7 ugil 3.5 ugil Na FB 23,000 ugil 115,000 ugil V FB 0.44 ugil 2.2 ugil		· · · · · · · · · · · · · · · · · · ·
Fe PB 273.7 49/L 1370 49/L 36 CB 1.9 49/L 9.5 49/L	Co FB 14,800 ugl 74,000 ugll Cr PB 1.4 ugll 7.0 ugll Co CB 0.7 ugll 3.5 ugll Cu FB 3.9 ugll 19.5 ugll Al FB 41.7 ugll 209 ugll	Mg FB 2510 ugl 12,550 mglL. K FB 1520 mglL 7800 mglL Na FB 23,000 mglL 115,000 mglL V FB 0.44 mglL 2.2 mglL Zn FB 53.8 mglL 269 mglL Sb CB 1.9 mglL 9.5 mglL

NOTE: Blanks analyzed during a soil case must be converted to mg/kg in order to compare them with the sample results.

Conc. in ug/L X Volume diluted to (200ml) X 1L X 1000gm X 1mg = mg/kg Weight digested (1gram) 1000ml 1kg 1000ug

Multiplying this result by 5 to arrive at the action level gives a final result in mg/kg which can then be compared to sample results.

VII. LABORATORY DUPLICATES

List the concentrations of any analyte not meeting the criteria for duplicate precision. For soil duplicates, calculate the CRDL in mg/kg using the sample weight, volume and percent solids data for the sample. Indicate what criteria was used to evaluate precision by circling either the RPD or CRDL for each element.

				MATRIX:	AQ.	
Element	CRDI	-	Sample !	Duplicates	RPD	Action
	water	soil	5W-04	5W-04D		
8. V		mg/kg		4	4	•
Aluminum	200-1-	i-		i 	i	
Antimony	60_}_	 i	- 0000	i	i	i
Arsenic	10-1-	i —	5.9989	4.0823	38.0	None *
Barium	200	i-		i 		
Beryllium	\5_\-	i	 -		İ	
Cadmium	5-1-	i		{		
Calcium	_5000_	i		 		! !
Chromium	10-1-	i		 		
Cobalt	50_	 i_	1,2009	1,4840	21.1	Nonex
Copper	25			! 1	<u> </u>	l
Iron	100			ļ	l	
Lead	5_ _	i —	6.0231	4.7763	23.1	None *
Magnesium_	5000	¦_]		
Manganese	15_	l_				
Mercury	0.2			 		
Nickel	40_	i	3.3201	2.6761	21.5	Nover
Potassium_	5000					
Selenium	5		3.0011	2.64	"200"	77
Silver	10					
Sodium	5000	· · · · · · · · · · · · · · · · · · ·			1	
Thallium	10			\] ———
Vanadium	50				!	
Zinc	20					· · · · · · · · · · · · · · · · · · ·
Cyanide	10					

Laboratory Duplicate Actions should be applied to all other samples of * all values 25x CRDL and paired results are within the same matrix type.

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ACTIONS:

* * Train

- Estimate (J) positive results for elements which have an RPD >20% for waters and >35% for soils.
- If sample results are less than 5x the CRDL, estimate (J) positive results for elements whose absolute difference is >CRDL, (2xCRDL for soils). If both samples are non-detected, the RPD is not calculated (NC).

XI. IND	CTIVELY	COUPLED	PLASHA (ICP)	SERIAL DILUTIO	IBYȚANA NO	e
	of the	diluted a	were performants were performants with the second s	med for each m sis agreed with ysis.	atrix and in ten pe	results rcent of
	Serial	Dilutions	were not pe	rformed for the	e followin	g:
	not agr	ee within	were perfor 10% for ana re dilution.	cmed, but analy lyte concentrat	tical res tions grea	 ults did ter than
Report a criteria	ll resu for ICP	lts below serial d	that do no ilution anal	ot meet the re	quired la	boratory
MATRIX:	water					
ELEMENT	IDL	50xIDL	SAMPLE RESULT	SERIAL DILUTION	₹ D	ACTION
Aluminum						
Barium_ Beryllium	<u>.</u> ———	-				
Cadmium_	"\					
Calcium_	- }					
Chromium_ Cobalt	_	· (ii	
Copper	- [-			<u> </u>	
Iron	5.7	285	880-48	2122,48	141	丁
Lead	-	- -			i	
Magnesium		-ìi-		·	i	
Manganese Nickel		- -		· [————	<u> </u>	
Potassium	74.0	3700	5104.48	4082.59	20	3
Silver	-	-]	
Sodium	_	-				
Vanadium_ Zinc	-	-i~ j-		<u> </u>	ii	
ZINC	i	i i		i	i 1	

Actions apply to all samples of the same matrix.

ACTIONS:

1. Estimate (J) positive results if %D >15.

XII. DETECTION LIMIT RESULTS

1. Ynst	rument Detection Limits	
	Instrument Detection Limit results were present a less than the Contract Required Detection Limits	nd found to be
	IDLs were not included in the data package on For	rm XI.
	IDLs were present, but the criteria was not following elements:	met for the
2. Repo	rting Requirements	
*	Were sample results on Form I reported down to the IDL not the CRDL for all analytes?	Yes or No
	Were sample results that were analyzed by ICP for Se, Tl, As, or Pb at least 5x IDL.	· -Yes or No NA
	Were sample weights, volumes, and dilutions taken into account when reporting detection limits on Form I.	Yes or No

If No.

The reported results may be inaccurate. Make the necessary changes on the data summary tables and request that the laboratory resubmit the corrected data.

IDLS reported on form 10 for ICP JA61 in data package as submitted did not match the IDLS reported for undetected analytes in the samples analyzed on this instrument. Laboratory provided a hand-corrected form 10 on 8/31/01, indicating IDLS consistent with the reported values and on established date of 1/17/01 (instead of 4/17/01).

COE 8/31/01

Spring Baseflow



356 FARRAGUT CROSSING DR. KNOXVILLE, TN 37922

[423] 966-8880 FAX (423) 966-8885 cerikson@trilliuminc.com

August 13, 2001

Mr. Larry McTiernan Roux Associates, Inc. 25 Corporate Drive Suite 230 Burlington, MA 01803

Subject:

STL Connecticut Report No. 7001-0830A

Downgradient Transport (Surface Water and Sediments) Investigation

Industri-Plex Site Woburn, Massachusetts

Total TAL Metals: 2/Surface Water/SW-04, SW-09

1/Field Blank

Selected Total Metals: 3/Surface Waters/SW-01, SW-02, SW-10

(Field Duplicates: SW-01/SW-10)

Dissolved Arsenic: 5/Surface Waters/SW-01, SW-02, SW-04, SW-09, SW-10

(Field Duplicates: SW-01/SW-10)

1/Field Blank

Total Suspended Solids: 5/Surface Waters/SW-01, SW-02, SW-04, SW-09,

SW-10

(Field Duplicates: SW-01/SW-10)

1/Field Blank

Dear Mr. McTiernan:

A Tier II validation was performed on the inorganic analytical data for two surface water samples collected by Roux Associates, Inc., at the Industri-Plex Site in Woburn, Massachusetts. Several additional samples were also reported in this data package, but, per project specifications, only the results for SW-04 and SW-09 were validated. The samples were analyzed according to EPA Methods 6010B/7470A, as applicable, for metals and EPA Method 160.2 for TSS. For SW-04 and SW-09, the full TAL (target analyte list, per the Contract Laboratory Program) was reported for the total metals fractions and arsenic only was reported for the dissolved fractions.

The data were evaluated as Tier II level in accordance with the "Region I Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses" dated June 13, 1988, and the project-specific Quality Assurance Project Plan (QAPP). The evaluation was based on the following parameters:

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Mr. Larry McTiernan 13 August 2001 Page 2

- Overall Evaluation of Data and Potential Usability Issues.
- Data Completeness.
- Preservation and Technical Holding Times.
- * Instrument Calibration.
- * Contract Required Detection Limit (CRDL) Standards.
 - Blanks.
 - Inductively Coupled Plasma (ICP) Interference Check Samples.
- Matrix Spike (MS).
- Laboratory Duplicates.
- * Field Duplicates.
- Laboratory Control Sample.
 - ICP Serial Dilution Analysis.
 - Detection Limit Results.
- NA PE Samples/Accuracy Check.
 - Sample Quantitation
- * = All criteria were met for this parameter.
- NA = Not Applicable.

Note: Worksheets for QC parameters that met criteria or are not applicable to the method will not be included as attachments to this document.

Table I summarizes the validation recommendations which were based on the following information. Table II summarizes the overall evaluation of the data with reference to the data quality objectives (DQOs) and potential usability issues.

Overall Evaluation of Data and Potential Usability Issues

Metals

The DQO for this site is to collect data of sufficient quality to allow a technically sound evaluation of sediment fate and transport, as well as impacts to surface water, in the Hall's Brook Holding Area (HBHA), located just downstream of the Industri-Plex site. The primary intended use for the data is to determine if the HBHA sediments are being entrained and/or transported out of the HBHA during storm events. The primary analytical objective is that measurements be representative of the actual site conditions and that data resulting from field sampling and analysis activities be comparable.

Sample results for metals were qualified as the result of measurement error, which includes both analytical (laboratory) error and sampling (field) error. Measurement error associated with analysis includes laboratory blank contamination, an unacceptable interference check sample result for



Mr. Larry McTiernan 13 August 2001 Page 3

selenium, and an unacceptable serial dilution result for potassium. Major impacts on data usability include:

- Results for cobalt in SW-04 and SW-09 were qualified as less than the reported values
 (U) based on laboratory blank contamination.
- The result for thallium in SW-09 was qualified as less than the reported value (U) based on laboratory blank contamination.

Measurement error associated with sample collection includes field blank contamination. Major impacts on data usability include:

• Results for calcium, chromium, and magnesium in SW-04 and SW-09 were qualified as less than the reported values (U) based on field blank contamination.

Total Suspended Solids (TSS)

All quality control criteria were met for the TSS analyses of these samples.

Data Completeness

No raw data were included in the data package. This is inconsistent with Region I guidelines, which specify that full Tier III deliverables are to be provided for all data packages no matter what level of validation is to be performed. However, the lack of raw data is acceptable to the client and does not adversely affect the Tier II validation effort. Therefore, no further action was taken on this basis.

For the dissolved metals analyses, Form 13 indicated a preparation date of 4/18/01 and Form 14 indicated an analysis date of 4/17/01. The laboratory was contacted on 8/6/01 and asked to clarify this discrepancy. On 8/9/01, the laboratory responded via facsimile, explaining that "the Form 13 for dissolved metals was submitted in error. The filtered metals samples were not prepped. However, in order to process the data, a prep date had to be entered into the software program. Page 105 (the Form 13 for the Filtered metals) should be removed from the data package." Page 105 was, therefore, removed from the data package and replaced with a blank sheet containing the notation "This page intentionally left blank." No further action was taken on this basis.

Blanks

The following analytes were detected in associated blanks:



Mr. Larry McTiernan 13 August 2001 Page 4

Analyte	Type of Blank	Maximum Concentration	Action Level	Action
Barium	Field	5.4 μg/L	27.0 μg/L	None
Calcium	Field	10,000 μg/L	50,000 μg/L	U
Chromium	Field	0.46 μg/L	2.3 μg/L	U
Cobalt	Preparation	0.68 μg/L	3.4 μg/L	U
Copper	Field	1.4 μg/L	7.0 μg/L	None
Iron	Field	32.4 μg/L	162 μg/L	None
Magnesium	Field	i,890 μg/L	9,450 μg/L	U
Manganese	Field	5.2 μg/L	26.0 μg/L	None
Potassium	Field	604 μg/L	3,020 μg/L	None
Silver	Preparation	0.48 μg/L	2.4 μg/L	None
Sodium	Field	9,160 μg/L	45,800 μg/L	None
Thallium	Preparation	4.8 μg/L	24.0 μg/L	υ
Zinc	Field	9.9 μg/L	49.5 μg/L	None

Barium, copper, iron, manganese, potassium, sodium, and zinc were present in both samples at concentrations exceeding the action limit for each analyte; therefore, no qualifiers were warranted for these elements based on blank contamination.

Silver was not detected in either sample and thallium was not detected in SW-04; therefore, no qualifiers were warranted for these elements in the indicated samples based on blank contamination.

Results for calcium, chromium, cobalt, and magnesium in SW-04 and SW-09 and for thallium in SW-09 were qualified as less than the reported values (U) based on blank contamination.

Interference Check Sample

An unacceptably low recovery (71.8%) was reported for selenium in the interference check sample analysis associated with the total metals analyses. Results for selenium in SW-04 and SW-09 were qualified as estimated (UJ) on this basis.



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Serial Dilution

The serial dilution result for potassium was more than 10% different from the original, undiluted analysis result (17.6%). Since the %D exceeded 15%, results for potassium in SW-04 and SW-09 were qualified as estimated (J) on this basis, per Region I guidelines.

Detection Limit Results

Instrument detection limits (IDLs) on Form 10 in the data package did not match the IDLs reported for undetected analytes in the samples. The Form 10 was also dated 4/17/01, which is after the reported total metals analyses were performed and the same day as the reported dissolved metals analyses were performed. The laboratory was contacted on 8/6/01 and asked to clarify this discrepancy. A hand-corrected Form 10 was provided via facsimile on 8/9/01, but the date was not changed. Based on comparison to the Form 10 in the data package for #7001-0698A, the date was corrected to 1/15/01 by the validator.

Sample results reported for undetected target analytes were consistent with the corrected IDLs provided by the laboratory on 8/9/01.

Sample Quantitation

The following validated dissolved results for arsenic were greater than validated total results for arsenic:

Sample	Total As (μg/L)	Dissolved As (μg/L)	%Difference	Action
SW-04	6.9	11.2	62.3%	J
SW-09	3.5 U	3.8		J, UJ

Because the percent difference is greater than 10%, results for total and dissolved arsenic in SW-04 were qualified as estimated (J) based on the discrepancy between the measured total and dissolved concentrations. Since the positive result for total arsenic in SW-09 is less than twice the IDL, this discrepancy probably reflects the increased variability inherent in measurements at low concentrations. Results for total and dissolved arsenic in SW-09 were qualified as estimated (J, UJ) on this basis.

Results for cadmium in SW-09 and for vanadium in SW-04 and SW-09 were qualified as estimated (J) because they are less than twice the applicable instrument detection limit and were not otherwise



Mr. Larry McTiernan 13 August 2001 Page 6

qualified. All "B" flags applied by the laboratory to sample results below the applicable CRDL were removed.

Please contact the undersigned at (865) 966-8880 if you have any questions or need further information.

Very truly yours,

TRILLIUM, INC.

Carol A. Erikson

Quality Assessment Manager

Carola Exik Ster

CAE/ekd #00662

Attachments: Table I: Recommendation Summary

Table II: Overall Evaluation of Data

Data Summary Key Data Summary Tables

Data Validation (DV) Worksheets

\Roux SedTransport\0830in.wpd



TABLE I

INDUSTRI-PLEX SITE

STL Connecticut Report #7001-0830A

Recommendation Summary

Sample Nos.	Matrix	Total TAL Metals	Dissolved Arsenic	TSS
SW-04	AQ	$A^1, J^{1,2,3,5}$	1_3	Α
SW-09	AQ	$A^{1,2}, J^{1,2,3,4,5}$	J_3	Α

AQ - aqueous

- A = Accept the results for the sample.
- A¹ = Accept the results for the sample, but qualify the positive results for calcium, chromium, cobalt, and magnesium as not detected (U) due to blank contamination.
- A² = Accept the results for the sample, but qualify the positive result for thallium as not detected (U) due to blank contamination.
- J¹ = Estimate (UJ) the result for selenium based on an unacceptably low recovery in the associated interference check sample.
- $J^2 =$ Estimate (J) the result for potassium due to unacceptable serial dilution analysis results.
- J³ = Estimate (J, UJ) the results for total and dissolved arsenic based on discrepancies between the measured total and dissolved concentrations.
- J⁴ = Estimate (J) the result for cadmium it is less than twice the applicable instrument detection limit and was not otherwise qualified based on the validation effort.
- J^5 = Estimate (J) the result for vanadium it is less than twice the applicable instrument detection limit and was not otherwise qualified based on the validation effort.

INDUSTRI-PLEX SITE STL REPORT #7001-0830A Overall Evaluation of Data

	Total TAL ivietals,	Selected TAL Metals, D	issolved Arsenic, and To	ai Suspende	1 Solids		
DQOs (list all DQOs)	Sampling and/or Analytical Method Appropriate Yes or No	Measurement Error		Measurement Error		Sampling Variabilit y**	Potential Usability Issues
		Analytical Error	Sampling Error*				
The DQO for this site is to collect data of sufficient quality to: 1. Allow a technically sound evaluation of sediment fate and transport, as well as impacts to surface water, in the Hall's Brook Holding Area (HBHA), located just downstream of the Industri-Plex site. 2. Determine if the HBHA sediments are being entrained and/or transported out of the HBHA during storm events. 3. Be representative of the actual site conditions and comparable to other data generated in support of this project.	Analytical Method: Yes SW-846 Methods 6010B (metals), 7471A (mercury) and 160.2 (TSS) Sampling Method: Yes Grab	Refer to qualifications in Table I A ^{1,2} J ^{1,2,3,4,5}	Refer to qualifications in Table I A ¹		 Results for calcium, chromium, cobalt and magnesium in both samples were qualified as less than the reported values due to blank contamination. The result for thallium in SW-09 was qualified as less than the reported value due to blank contamination. Results for selenium in both samples were estimated due to an unacceptable interference check sample recovery. Results for potassium in both samples were estimated due to an unacceptable serial dilution result. Results for total and dissolved arsenic in both samples were estimated due to discrepancies between measured total and dissolved concentrations. Results for cadmium in SW-04 and for vanadium in both samples were estimated because they are less than 2xIDL. 		

The evaluation of "sampling error" cannot be completely assessed in data validation. Sampling variability is not assessed in data validation.



DATA SUMMARY KEY INORGANIC DATA VALIDATION

- **J** = The associated value is an estimated quantity.
- R = The data are unusable. (Note: Analyte may or may not be present).
- U = The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.
- UJ = The material was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

DATA SUMMARY FORM: TOTAL TAL METALS WATER SAMPLES

(ug/L)

Site Name: Industri-Plex

STL Report No. 7001-0830A

	Sample Number	SW-04	SW-09)	
	Lab ID	T010830A-03	T010830/	\-04	
	Date Sampled	5-Apr-01	5-Apr-0	1	
CRDL		:	<u> </u>	:: 	
200	Aluminum	107	62.2		
60	Antimony	3.6 U	3.6	U	
10	Arsenic	6.9 J	3.5	UJ	
200	Barium	36.6	34.9		
5	Beryllium	0.20 U	0.20	U	
5	Cadmium	0.64	0.47	J	
5000	Calcium	32500 U	32200	U	
10	Chromium	1.8 U	1.6	U	
50	Cobalt	1.4 U	0.98	U	
25	Соррег	21.9	16.2		
100	Iron	1050	883		
3	Lead	1.8 U	1.8	U	
5000	Magnesium	4810 U	4710	U	
15	Manganese	235	183		
0.2	Mercury	0.10 U	0.10	U	
40	Nickel	2.4	2.0	<u>.</u>	
5000	Potassium	6890 J	6890	J	
5	Selenium	3.6 UJ	3.6	UJ	
10	Silver	0.40 U	0.40	U	
5000	Sodium	56100	56800		
10	Thallium	4.2 U	4.6	U	
50	Vanadium	0.55 J	0.56	J	
20	Zinc	334	284		

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DATA SUMMARY FORM: SELECTED DISSOLVED METAL WATER SAMPLES (ug/L)

Site Name: Industri-Plex STL Report No. 7001-0830A

	Site ivalie. In	dustri-r lox		STE Report No. 7001-0050A
	Sample Number	SW-04	SW-09	
		F010830A-03	F010830A-04	
	Date Sampled 5-Apr-01		5-Apr-01	
			ļ	
CRDL		<u> </u>	↓	
10	Arsenic	11.2 J	3.8 J	
	- 	1		
				\Roux SedTransport\0830in2

EPA 6010B/7470A Page 1 of 1

DATA SUMMARY FORM: TOTAL SUSPENDED SOLIDS WATER SAMPLES (mg/L)

Site Name: Industri-Plex

STL Report No. 7001-0830A

	Site Maine. III	addit i ion						
	Sample Number	SW-04	SW-09					
	Lab ID	010830A-0	3 010830A-04					
Date Sampled		5-Apr-01		5-Apr-01				
CRDL	·		<u> </u>	<u> </u>			, -	
5.0	TSS	5.0 U	5,0 U	!				
				:				
			:					
				<u> </u>	· · · · · · · · · · · · · · · · · · ·	\D C-4T\0020+		

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REGIO	N	I	
Data	Re	view	Worksheets

Site Name	Indust	ri-P	ex
Reference	Number		

REGION I REVIEW OF INORGANIC CONTRACT LABORATORY DATA PACKAGE

CONTRACT LABORATORY DATA PACKAGE	
Trillium, Inc.	
The hardcopied (laboratory name) 5TL Connecticut data	nackana waasiiisi
at Region I has been reviewed and the quality assurance	hackade teceived
data summarized. The data review included:	and performance
	.1 .
Case No. 7001-0830A SAS No. Sampling Date(s) SDG. No. Matrix AG Shipping Date(s)	4/5/01
SDG. No. Matrix AG Shipping Date(s)	4/5/01
No. of Samples 5 Date Rec'd by La	ib 4/6/0/
• ••••••	
Traffic Report Nos: SW-01, SW-02, SW-04, SW-0	17,5W-10
Trip Blank No.:	
Equipment Blank No.: Field Blank	
Field Dup Nos: 5w-01/5w-10	
EPA 6000 /7470A , 140.2 sow No. requires that specific analytical work associated reports be provided by the laboratory to the	
sow No requires that specific analytical work	De done and that
LV, and SMO. The general criteria used to determine the	berrormance were
based on an examination of:	
-Data Completeness -Field Duplica	toe
	Sample Results
-Holding Times -Lab Control S -Calibrations -Furnace AA Re	
	lution Results
-ICP Interference Check Results -Detection Lim	
-Matrix Spike Recoveries -Sample Quanti	
-Laboratory Duplicates	
Overall Comments: Tier I Validation - 5W-04 and	
Overall comments: Tier I Validation - 5W-04 and	- 5W-09 only
	-
Definitions and Qualifiers:	
A - Acceptable data.	
J - Approximate data due to quality control criteria.	a.
R - Reject data due to quality control criteria.	
U - Analyte not detected.	
	,
Reviewer: CO Evik Str Date	. of 8/1/01
Kentemet: Co. Onli on Date	2: \$ 8/6/01
	ere)

I. DATA COMPLETENESS

MISSING INFORMATION DATE LAB CONTACTED DAT	E REC'D
raw data ox per client - no action	<u>ر</u>
	
<u>·</u>	•

II. HOLDING TIMES Complete table for all samples and pircle the analysis date for samples not within criteria.

SAMPLE ID	DATE SAMPLED	HG DATE ANALYSIS	CYANIDE DATE ANALYSIS	others Date Analysis	Hq	ACTION
5W-04 5W-09	4/5/01	prepalition		Prepapila Penalizion	42	None
2W-09	4/5/01			41701		0. HORES (13/0)
					pre	ar Macolista
						
1]		ļ	 	\ \	

METALS - 180 DAYS FROM SAMPLE COLLECTION MERCURY - 28 DAYS FROM SAMPLE COLLECTION CYANIDE - 14 DAYS FROM SAMPLE COLLECTION

ACTION:

An Indi

- If holding times are exceeded all positive results are estimated (J) and non-detects are estimated (UJ). ı.
- If holding times are grossly exceeded, the reviewer may determine that non-detects are unusable (R). 2.

A * * * * TOO * 110 100

HOST FOOTSTITTS!!

The state of the s

Fax Cover Sheet

Date: 8/1/01

To: Carol Ericson

Company: Trillium

Fax: 865.966.8885

Pages (Inc. cover sheet):

From: Paul Hobart

Direct Tel: 203-944-1307

SEVERN
TRENT
SERVICES

STL Connecticut 128 Long Hil Cross Road Shelton, CT 06484

Tel 203 929 8140 Fax 203 929 8142 www.stl-inc.com

	Message: Koux Industrial plex Trejust	
	Alfald is a consell Form 10 for SDG A0830. I Form 2B for SDG A0741.	
	For SDG A0830 the Form 13 was should for dissolved metals was submitted in error. The filtered metals samples very repeat. However, in order to process the date, a prophete had to be onted into the soft-are program. Page 105 (the Form 13 for the Filtered metals) shall be removed from the date packaged.	
-	I will for the sample receive information for SDG A0741 or soon or postler Deller	٠,

Confidentiality Notice: The information contained in the Faceimile message is privileged and confidential information intended only for the use of the addressee. If the reader of this message is not the intended recipient, or the employer or agent responsible to deliver the the intended recipient, you are hereby notified that any dissemination, distribution or copying of this communication is strictly prohibited. If you have received this communication in error, please notify us insmediately by telephone and please return the original message to us at the above address via the U.S. Postal Service.

IV A. BLANK ANALYSIS RESULTS (Sections 1-3)

List the blank contamination in Sections 1 & 2 below. A separate worksheet should be used for soil and water blanks.

1. Labo	ratory Blanks			MATRIX: AQ
DATE	ICB/CCB#	PREP BL	ANALYTE	CONC. /UNITS
4/0/01	_ccB_	· · · · · · · · · · · · · · · · · · ·	<u>K</u>	140.7 ug/L
· , ,			Na	10.9 ug/L
			Cv	0.3 Mg/L
			K	180,2 Mg/L
			Na	14.1 Mg/L
		_	Ca	2.6 Jug/L
2. Equi	∨ pment/Trip Bla	nks	Fe	6.1 ug/L
			NI TUMP	0000 4000
DATE	EQUIP BL#	الر	ANALYTE	CONC /UNITS
4501	Freld Blank	<u> </u>	Mn	5.2 Mg/L)
			K	402 Jugit
			Na	9140 Mall
			Zn	9.9 Mg/L
				J-

3. Frequency Requirements

A. Was a preparation blank analyzed for each matrix, for every 20 samples and for each digestion batch?

Yes or No

B. Was a calibration blank run every 10 samples or every 2 hours whichever is more frequent?

Yes or No

If No.

The data may be affected. Use professional judgement to determine the severity of the effect and qualify the data accordingly. Discuss any actions below, and list the samples affected.

IV A. BLANK ANALYSIS RESULTS (Sections 1-3)

List the blank contamination in Sections 1 & 2 below. A separate worksheet should be used for soil and water blanks.

1. Lab	oratory Blank	s		matrix: <u>AQ</u>
DATE	ICB/CCB#	PREP BL	ANALYTE	CONC, /UNITS
4/12/01	ICB		K	201.6 Mg/L
1	ICB_		Na	14.0 ug/L
	CCB		Ca	5.4 ug/L
			Ma	4.1 ag/L
			<u> </u>	195.1 nalL
	1		Na	12,3 Mg/L
Z. Equ	↓ aipment/Trip	Blanks	Na	10.1 uglL
DATE	EOUIP BI	<u>.</u> #	ANALYTE	CONC. /UNITE
				
		— <i>–</i>		
		/		-

- 3. Frequency Requirements
 - A. Was a preparation blank analyzed for each matrix, for every 20 samples and for each digestion batch?

Yes or No

B. Was a calibration blank run every 10 samples or every 2 hours whichever is more frequent?

Yes or No

If No.

The data may be affected. Use professional judgement to determine the severity of the effect and qualify the data accordingly. Discuss any actions below, and list the samples affected.

IV A. BLANK ANALYSIS RESULTS (Sections 1-3)

List the blank contamination in Sections 1 & 2 below. A separate worksheet should be used for soil and water blanks.

1. Labo	eratory Blanks			MATRIX: AQ
DATE	ICB/CCB#	PREP BL	ANALYTE	CONC, /UNITS
4/2/01	CCB		_Mg_	4.3 ug/L
<u>.</u>			<u> Mn</u>	0.2 Mg/L
			<u>K</u>	75.4 ug/L
			Na_	10.2 ug/L
	PBV	PBW	Co	0.682 Mg/L
			Aa	217.03 Hall
2. Equi	pment/Trip Bla	ınks	(Næ	8,975 WILL
DATE	EQUIP BL#		ANALYTE	41.835 (1917) CONC. /UNITS
4/5/01	Field Blank		Ва	5.4 Mg/L
		. (-	Ca	10,000 ug/L
		. `_	Cr	0.46 ug/L
			Cu	1.4 Lall
			Fe	32,4 ug/L
T_			Mg	1890 Mg/L
3. Freq	quency Requireme			<u> </u>
A.			analyzed for each	

A. Was a preparation blank analyzed for each matrix, for every 20 samples and for each digestion batch?

Yes or No

B. Was a calibration blank run every 10 samples or every 2 hours whichever is more frequent?

Yes or No

If No,

The data may be affected. Use professional judgement to determine the severity of the effect and qualify the data accordingly. Discuss any actions below, and list the samples affected.

IV B. BLANK ANALYBIB RESULTS (Section 4)

4. Blank Actions

The Action Levels for any analyte is equal to five times the highest concentration of that element's contamination in any blank. The action level for samples which have been concentrated or diluted should be multiplied by the concentration/dilution factor. No positive sample result should be reported unless the concentration of the analyte in the sample exceeds the Action Level (AL). Specific actions are as follows:

- 1. When the concentration is greater than the IDL, but less than the Action Level, report the sample concentration detected with a U.
- 2. When the sample concentration is greater than the Action Level, report the sample concentration unqualified.

matrix: <u>AQ</u>		MATRIX:/	40
<u>units</u> <u>uni</u>	L/ ELEMENT	MAX. CONC./ UNITS	AL/ UNITS
Ca 10,000 ug/L 50,00	Ougll Mg F	1890 Mg/L	9450 ug/L
Cr F13 0.46 ng/L 2.3	Mall Mn FE	5.2 ug/L	He ng/L.
Co PB 0.682 49/L 3.4	ugle - Ag PB	0.487 uglL	2.4 ugl
· CINFB 1.4 49/L 7.0	Mall "Na FB	9160 Mg/L	45,800 Mg/L
Ba FB 5,4 ug/L 27	ug/L. Te PB	4.835 Mg/L	24.2 ug/L
· Iron 32,4 49/ 162	mall . In FE	9.9 mg/L	49,5 Mg/L
· Potassium 604 ug/ 3021	Djugil		

NOTE: Blanks analyzed during a soil case must be converted to mg/kg in order to compare them with the sample results.

Conc. in ug/L X Volume diluted to (200ml) X 1L X 1000cm X 1mg = mg/kg Weight digested (1gram) 1000ml 1kg 1000ug

Multiplying this result by 5 to arrive at the action level gives a final result in mg/kg which can then be compared to sample results.

V A. ICP INTERFERENCE CHECK SAMPLE (Sections 1 & 2)

1. Recovery Criteria

List any elements in the ICS AB solution which did not meet the criteria for %R.

DATE 4/12/01	element Se	71.8	ACTION UJ	SAMPLES AFFECTED 5W-04, SW-09
				•

ACTIONS:

If an element does not meet the &R criteria, follow the actions stated below:

	PERCENT RECOVERY				
•	<50%	50-79*	>120%		
Fositive Sample Results	R	J	J		
Non-detected Sample Results	R	ひゴ	λ		

2. Frequency Requirements

Were Interference QC samples run at the beginning and end of each sample analysis run or a minimum of twice per 8 hour working shift, whichever is more frequent?



If no,

severity	of the	i qualify	the data	o determine y. Discuss

XI. IND	CTIVELY	COUPLED	PLASHA (ICP)	SERIAL DILUTIO	n ynythei	: 6
	of the	diluted a	s were perfor sample analys diluted anal	rmed for each m sis agreed with ysis.	atrix and in ten pe	results
	Serial	Dilutions	were not pe	rformed for the	followin	g:
	not agr	ee withir	were performed to the dilution.	rmed, but analy lyte concentrat	tical res ions grea	ults did ter than
Report a criteria	ll resu for ICP	lts below	v that do no Hilution anal	ot meet the rec ysis.	quired la	boratory
MATRIX:	_AQ_	<u> </u>				
ELEMENT	IDL	50xIDL	SAMPLE RESULT	SERIAL DILUTION	\$ D	ACTION
Aluminum	1	.		·	,	
Barium_	-	-				
Beryllium Cadmium	" j	· -		ļ ļ	<u>-</u>	
Calcium_	-	· [] -				
Chromium_Cobalt	-	· -		·		
Copper	·	·				
Iron	-}	. -				
Magnesius	<u> </u>	· [] -				
Manganese	3	. -				
Nickel Potassium	110.2	5810	6891.82	5477.62	17.6	
Silver		- - - -				
Sodium Vanadium	-	·ii-				
2inc		-			i	

Actions apply to all samples of the same matrix.

ACTIONS:

Estimate (J) positive results if %D >15.

XII. DETECTION LIMIT RESULTS

1. Inst	rument Detection Limits	
	Instrument Detection Limit results were present and less than the Contract Required Detection Limits.	d found to be
<u> </u>	IDLs were not included in the data package on For	m XI.
	IDLs were present, but the criteria was not following elements:	met for the
2. Repo	rting Requirements	
*_	Were sample results on Form I reported down to the IDL not the CRDL for all analytes?	Yes or No
	Were sample results that were analyzed by ICP for Se, Tl, As, or Pb at least 5x IDL.	-Yes or No NA
	Were sample weights, volumes, and dilutions taken into account when reporting detection limits on Form I.	Yes or No

If No.

The reported results may be inaccurate. Make the necessary changes on the data summary tables and request that the laboratory resubmit the corrected data.

* IDLS reported on Fm 10 in data package as submitted did not match the IDLS reported for undetected analytes. Laboratory provided a hand-corrected Form 10 on 8/9/01, but date still indicated IDLS established on 4/17/01, which is after these analyses—were performed.

Based on comparison to Fm 10 in Pkg 7001-0698A, the date was corrected to 1/15/01 by the evaluator.

+76000H3191 CT:7T T337//0/60

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356 FARRAGUT CROSSING DR. KNOXVILLE, TN 37922

(423) 966-8880 FAX (423) 966-8885 cerikson@trilliuminc.com

August 6, 2001

Mr. Larry McTiernan Roux Associates, Inc. 25 Corporate Drive Suite 230 Burlington, MA 01803

Subject:

STL Connecticut Report No. 7001-0830A

Downgradient Transport (Surface Water and Sediments) Investigation

Industri-Plex Site

Woburn, Massachusetts

SVOCs:

5/Surface Waters/SW-01, SW-02, SW-04, SW-09, SW-10

(Field Duplicates: SW-01/SW-10)

1/Field Blank

Dear Mr. McTiernan:

A Tier II validation was performed on the organic analytical data for two surface water samples collected by Roux Associates, Inc. at the Industri-Plex Site in Woburn, Massachusetts and reported in the above-referenced laboratory report. Additional samples were also reported in this data package, but, per project specifications, only the results for SW-04 and SW-09 were validated. All of the samples were analyzed according to EPA Method 8270C for semivolatile organic compounds (SVOCs). For SW-04 and SW-09, the full TCL (target compound list, per the Contract Laboratory Program), with cyclohexanone added as a target analyte, was reported.

The data were evaluated as Tier II level in accordance with the "Region I EPA NE Data Validation Functional Guidelines for Evaluating Environmental Analyses" dated December 1996, and the project-specific Quality Assurance Project Plan (QAPP), dated September 14, 1999. The evaluation was based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues.
- Data Completeness.
- Preservation and Technical Holding Times.
- NA Gas Chromatography/Electron Capture Detector (GC/ECD) Instrument Performance Checks.
 - Initial and Continuing Calibration.

HOME OFFICE:



Mr. Larry McTiernan 6 August 2001 Page 2

- Blanks.
- * Surrogate Compounds.
- * Internal Standards.
- * Matrix Spike (MS)/Matrix Spike Duplicates (MSD).
- * Field Duplicates.
 - Sensitivity Check (Method Detection Limit Study or Laboratory Fortified Blank).
- NA PE Samples/Accuracy Check.
- NA Target Compound Identification.
- NA Sample Quantitation and Reported Quantitation Limits.
- NA SVOC and Pesticides Cleanup.
- NA System Performance.
- * = All criteria were met for this parameter.
- NA = Not Applicable.

Note: Worksheets for QC parameters that met criteria or are not applicable to the method will not be included as attachments to this document.

Table I summarizes the validation recommendations which were based on the following information. Table II summarizes the overall evaluation of the data with reference to the data quality objectives (DQOs) and potential usability issues.

Overall Evaluation of Data and Potential Usability Issues

The DQO for this site is to collect data of sufficient quality to allow a technically sound evaluation of sediment fate and transport, as well as impacts to surface water, in the Hall's Brook Holding Area (HBHA), located just downstream of the Industri-Plex site. The primary intended use for the data is to determine if the HBHA sediments are being entrained and/or transported out of the HBHA during storm events. The primary analytical objective is that measurements be representative of the actual site conditions and that data resulting from field sampling and analysis activities be comparable.

SVOC sample results were qualified as the result of measurement error, which includes analytical (laboratory) and sampling (field) error. Measurement error associated with sample analysis includes an unacceptable initial calibration response and poor laboratory fortified blank performance. There was one major impact on data usability:

• Results for benzoic acid in SW-04 and SW-09 were rejected (R) as unreliable due to very poor recovery in the laboratory fortified blank analysis.





Mr. Larry McTiernan 6 August 2001 Page 3

Measurement error associated with sample collection includes field blank contamination. Major impacts on data usability include the following:

- Results for di-n-butylphthalate, bis(2-ethylhexyl)phthalate, and diethylphthalate in SW-04 and SW-09 were qualified as less than the sample-specific contract required quantitation limits (U) due to contamination in the associated field blank.
- The result for cyclohexanone in SW-09 was qualified as less than the sample-specific contract required quantitation limits (U) due to contamination in the associated field blank.

Data Completeness

No raw data were included in the data package. This is inconsistent with Region I guidelines, which specify that full Tier III deliverables are to be provided for all data packages no matter what level of validation is to be performed. However, the lack of raw data is acceptable to the client and does not adversely affect the Tier II validation effort. Therefore, no further action was taken on this basis.

Calibration

Compounds that did not meet criteria in the initial calibration are summarized in the following table.

Instrument ID:	HP5971Q	Actio	n		
Compound	IC 4/19/01	Positive Detects	NDs	Affected Samples	
cyclohexanone	%RSD=35.0%	J	UJ	SW-04, SW-09	

Sample results will be qualified as indicated above.

Blanks

The following compounds were reported in the associated method and/or field blanks:



Mr. Larry McTiernan 6 August 2001 Page 4 STL Connecticut Report #7001-0830A

Compound	Blank Type	Max Conc.	Action Limit	Action
bis(2-ethylhexyl)phthalate	Field	0.6 μg/L	6 μg/L	U
di-n-butylphthalate	Field	0.2 μg/L	2 μg/L	U
diethylphthalate	Field	0.3 μg/L	3 μg/L	U
butylbenzylphthalate	Field	0.2 μg/L	2 μg/L	None - ND
cyclohexanone	Field	0.6 µg/L	3 μg/L	U

Results for di-n-butylphthalate, bis(2-ethylhexyl)phthalate, and diethylphthalate in SW-04 and SW-09 were qualified as less than the sample-specific contract required quantitation limits (U) due to the associated field blank contamination.

The result for cyclohexanone in SW-09 was qualified as less than the sample-specific contract required quantitation limit (U) due to the associated field blank contamination.

Butylbenzylphthalate was not detected in either site sample, therefore no action was warranted with respect to this target analyte.

Laboratory Fortified Blank

Recovery of pentachlorophenol (128%; QC 63-125%) was unacceptably high in the laboratory fortified blank analysis. This target analyte was not detected in either site sample, and no qualifiers were applied on this basis.

Although acceptance limits of 0-25% were designated by the laboratory on the summary form in the data package, very poor recovery was demonstrated for benzoic acid in the laboratory fortified blank analysis, based on the validator's professional judgment (9%). Results for benzoic acid in SW-04 and SW-09 were rejected (R) on this basis.



Mr. Larry McTiernan 6 August 2001 Page 5

Please contact the undersigned at (865) 966-8880 if you have any questions or need further information.

Very truly yours,

TRILLIUM, INC.

Carol A. Erikson

Quality Assessment Manager

Caral Enit 501

CAE/ekd

Attachments: Table I: Recommendation Summary

Table II: Overall Evaluation of Data

Data Summary Key

Data Validation (DV) Worksheet

Data Summary Table

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TABLE I

INDUSTRI-PLEX SITE

STL Connecticut Report #7001-0830A

Recommendation Summary

Sample Nos.	Matrix	TCL SVOCs		
SW-04	AQ	A^1 , J^1 , R^1		
SW-09	AQ	$A^{1,2}, J^1, R^1$		

AQ - aqueous

- A¹ = Accept the results for the sample, but qualify the results for di-n-butylphthalate, bis(2-ethylhexyl)phthalate, and diethylphthalate as not detected (U) at the sample-specific CRQL due to field blank contamination.
- A^2 = Accept the results for the sample, but qualify the result for cyclohexanone as not detected (U) at the sample-specific CRQL due to field blank contamination.
- J¹ = Estimate (UJ) the results for cyclohexanone due to a high %RSD value in the initial calibration.
- R¹ = Reject (R) the results for benzoic acid due to very poor recovery (<10%) in the associated laboratory fortified blank.

TABLE II

INDUSTRI-PLEX SITE STL REPORT #7001-0830A Overall Evaluation of Data

Semivolatile Organic Compounds (SVOCs)								
DQOs (list all DQOs)	Sampling and/or Analytical Method Appropriate Yes or No	Measurement Error		thod Measurement Error		Sampling Variability **	Potential Usability Issues	
		Analytical Error	Sampling Error*					
The DQO for this site is to collect data of sufficient quality to: 1. Allow a technically sound evaluation of sediment fate and transport, as well as impacts to surface water, in the Hall's Brook Holding Area (HBHA), located just downstream of the Industri-Plex site. 2. Determine if the HBHA sediments are being entrained and/or transported out of the HBHA during storm events. 3. Be representative of the actual site conditions and comparable to other data generated in support of this project.	Analytical Method: Yes SW-846 Method 8270C Sampling Method: Yes Grab	Refer to qualifications in Table I J R 1	Refer to qualifications in Table I A ^{1,2}		1. Results for di-n-butylphthalate, bis(2-ethylhexyl)phthalate, diethylphthalate, and cyclohexanone were qualified as less than the sample-specific CRQLs due to blank contamination. 2. Results for benzoic acid were rejected due to a very poor laboratory fortified blank recovery. 3. Results for cyclohexanone were estimated (UJ) due to a high %RSD value in the initial calibration.			

- * The evaluation of "sampling error" cannot be completely assessed in data validation.
- ** Sampling variability is not assessed in data validation.

DATA SUMMARY KEY ORGANIC DATA VALIDATION

R = The data are unusable (compound may or may not be present). Resampling and

The associated numerical value is an estimated quantity.

J

- reanalysis are necessary for verification. The R replaces the numerical value or sample quantitation limit.
- U = The compound was analyzed for, but not detected. The associated numerical value is the sample quantitation limit or the adjusted sample quantitation limit.
- UJ = The compound was analyzed for, but not detected. The associated numerical value is the estimated sample quantitation limit.

DATA SUMMARY TABLE - TCL SEMIVOLATILE ORGANICS 1 WATER SAMPLES (ug/L)

Site Name: Industri-Plex

STL Report #7001-0830A

Sample Number	SW-04	SW-09	
Lab ID	010830A-03	010830A-04	
Dilution Factor*	1.00	1.02	
Date Sampled	05-Apr-01	05-Apr-01	
Date Extracted	11-Apr-01	11-Apr-01	
Date Analyzed	20-Apr-01	20-Apr-01	
CRQL**		# :	
10 Cyclohexanone	UJ	10 UJ	
10 Phenol			
10 bis(2-Chloroethyl)ether			
10 2-Chlorophenol			
10 1,3-Dichlorobenzene	. <u>.</u>		
10 1,4-Dichlorobenzene			
10 Benzyl alcohol			
10 1,2-Dichlorobenzene			
10 2-Methylphenol			
10 bis(2-chloroisopropyl)ether		: 	
10 4-Methylphenol		<u> </u>	
10 N-Nitroso-di-n-propylamine		<u> </u>	
10 Hexachloroethane			
10 Nitrobenzene		<u> </u>	
10 Isophorone			
10 2-Nîtrophenol			
10 2,4-Dimethylphenol			
50 Benzoic acid	R	R	
10 bis(2-Chloroethoxy)methane	<u> </u>		
10 2,4-Dichlorophenol			
10 1,2,4-Trichlorobenzene	<u> </u>	ļ i i	
10 Naphthalene			VP

^{*} includes adjustment for use of a sample volume slightly smaller than 1000 mL

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^{**} blank spaces mean the analyte was not detected; sample-specific CRQLs are equal to unadjusted CRQL times the DF

DATA SUMMARY TABLE - TCL SEMIVOLATILE ORGANICS 2 WATER SAMPLES (ug/L)

Site Name: Industri-Plex

STL Report #7001-0830A

Sample Number	SW-04	SW-09	., :	* - -	an and Cantrina		· · · · · · · · · · · · · · · · · · ·			
Lab ID	010830A-03	010830A-04								
Dilution Factor*	1.00	1.02								
Date Sampled	05-Apr-01	05-Apr-01								
Date Extracted	11-Apr-01	11-Apr-01				1				
Date Analyzed	20-Apr-01	20-Apr-01		J			,			
CRQL**		l		<u> </u>				<u></u>	اـ	
10 4-Chloroaniline						i				
10 Hexachlorobutadiene			 		.					. ‡
10 4-Chloro-3-methylphenol				 					· · · · · · · · · · · · · · · · · · ·	
10 2-Methylnaphthalene			i i							
10 Hexachlorocyclopentadiene							i			
10 2,4,6-Trichlorophenol										
50 2,4,5-Trichlorophenol										
10 2-Chloronaphthalene				: 	!					
50 2-Nitroaniline						:				
10 Dimethylphthalate					į					
10 Acenaphthylene						_ :	<u>i</u>			
10 2,6-Dinitrotoluene								·		
50 3-Nitroaniline								<u> </u>		
10 Acenaphthene		1				<u> </u>		1		
50 2,4-Dinitrophenol								<u> </u>		
50 4-Nitrophenol										
10 Dibenzofuran										
10 2,4-Dinitrotoluene					i					
10 Diethylphthalate	10 U	10 U		L						
10 4-Chlorophenyl-phenylether		<u> </u>						<u> </u>		4
10 Fluorene				<u> </u>						
50 4-Nitroaniline		1						i		

^{*} includes adjustment for use of a sample volume slightly smaller than 1000 mL

\Roux SedTransport\0830SV

^{**} blank spaces mean the analyte was not detected; sample-specific CRQLs are equal to unadjusted CRQL times the DF

DATA SUMMARY TABLE - TCL SEMIVOLATILE ORGANICS 3 WATER SAMPLES (ug/L)

Site Name: Industri-Plex

STL Report #7001-0830A

Sample Number	SW-04	SW-09						
Lab ID	010830A-03	010830A-04						
Dilution Factor*	1.00	1.02				1		
Date Sampled	05-Apr-01	05-Apr-01			:			
Date Extracted	II-Apr-01	11-Apr-01					į	
Date Analyzed	20-Apr-01	20-Apr-01						
CRQL**		L	<u> </u>	<u> </u>	<u>'</u> I			
50 4,6-Dinitro-2-methylphenol								i
10 N-Nitrosodiphenylamine								
10 4-Bromophenyl-phenylether			<u>; </u>	. <u> </u>			<u> </u>	
10 Hexachlorobenzene					 			
50 Pentachlorophenol			<u> </u>					
10 Phenanthrene				<u>_</u>				
10 Anthracene	<u> </u>							
10 Di-n-butylphthalate	10 U	10 U	<u> </u>				<u> </u>	
10 Fluoranthene			· ·					
10 Pyrene		<u> </u>	;				:	: : 1
10 Butylbenzylphthalate								
20 3,3'-Dichlorobenzidine			·				!	
10 Benzo(a)anthracene					<u> </u>			
10 Chrysene								
10 bis(2-Ethylhexyl)phthalate	10 U	10 U		i				
10 Di-n-octylphthalate	<u> </u>						:	:
10 Benzo(b)fluoranthene	L	l						
10 Benzo(k)fluoranthene								•
10 Benzo(a)pyrene				·				ļl
10 Indeno(1,2,3-cd)pyrene								
10 Dibenz(a,h)anthracene								
10 Benzo(g,h,i)perylene								

^{*} includes adjustment for use of a sample volume slightly smaller than 1000 mL

\Roux SedTransport\0830SV

^{**} blank spaces mean the analyte was not detected; sample-specific CRQLs are equal to unadjusted CRQL times the DF

Site Name	Industri	-Plex
Reference N		

REGION I ORGANIC DATA VALIDATION

REGION I ORGANICE DI	THE VILLIDATION
The following data package has been validated:	·
Lab Name <u>SN Connecticut</u> Case/Project No. SDG No. <u>7001-0830A</u> No. of Samples/Matrix	·
Traffic Report Sample Nos	-02, 5W-04, 5W-09, 5W-10
The Region I. EPA-NE Data Validation Functional Gurevision 12/96 was used to evaluate the data a Functional Guidelines were used to evaluate the data and criteria from EPA approved QAPjP or amendment to a Tier II or Tier III evaluation was used to validate the	and/or approved modifications to the EPA-NE d are attached to this cover page: (attach modified QAPjP). e data (circle one). If a Tier II validation with a
partial Vier III was used, then identify samples, parame	eters, etc. that received partial Tier III validation
on 5w-04 and 5w-09	only.
The data were evaluated based upon the following para	ameters:
 Overall Evaluation of Data Data Completeness (CSF Audit - Tier I) Preservation & Technical Holding Times GC/MS & GC/ECD Instrument Performance Check Initial & Continuing Calibrations Blanks Surrogate Compounds Internal Standards Matrix Spike/Matrix Spike Duplicate 	 Field Duplicates Sensitivity Check PE Samples/Accuracy Check Target Compound Identification Compound Quantitation and Reported Quantitation Limits TICs Semivolatile and Pesticide/PCB Cleanup System Performance
Region I Definitions and Qualifiers:	
A - Acceptable Data J - Numerical value associated with compound is an R - The data are rejected as unusable. The R replaces U - Compound not detected at that numerical sample UJ - The sample quantitation limit is an estimated quantB, BB, EB - Compound detected in aqueous trip bla blank associated with soil/sediment samples.	the numerical value or sample quantitation limit. quantitation limit. ntity.
Validator's Name Carol Erikson Company Na Date Validation Started 8/4/01	ame Trillium, Inc. Phone Number 865 966 8880
Date Validation Started 8/4/01	Date Validation Completed

Data Validation Worksheet Cover Page - Page 2

Check if all criteria are met and no hard copy worksheet provided. Indicate NA if worksheet is not applicable to analytical method. Note: there is no standard worksheet for System Performance, however, the validator must document all system performance issues in the Data Validation Memorandum.

VOA/SV worksheets:

VOA/SV-Pest/PCB VOA/SV-II VOA/SV-III VOA/SV-III VOA/SV-IV VOA/SV-Pest/PCB-V-A VOA/SV-Pest/PCB-V-B VOA-VI SV-VI VOA/SV-Pest/PCB-VIII VOA/SV-Pest/PCB-IX VOA/SV-Pest/PCB-X VOA/SV-Pest/PCB-XI VOA/SV-Pest/PCB-XII VOA/SV-Pest/PCB-XIII VOA/SV-Pest/PCB-XIII VOA/SV-Pest/PCB-XIII VOA/SV-Pest/PCB-XIII VOA/SV-XIV VOA/SV-XV TABLE II-WORKSHEET	COMPLETE SDG FILE (CSF) AUDIT PRESERVATION AND HOLDING TIMES GC/MS INSTRUMENT PERFORMANCE CHECK (TUNING) INITIAL CALIBRATION CONTINUING CALIBRATION BLANK ANALYSIS BLANK ANALYSIS VOA SURROGATE SPIKE RECOVERIES SV SURROGATE SPIKE RECOVERIES INTERNAL STANDARD PERFORMANCE MATRIX SPIKE/MATRIX SPIKE DUPLICATE FIELD DUPLICATE PRECISION SENSITIVITY CHECK ACCURACY CHECK TARGET COMPOUND IDENTIFICATION SAMPLE QUANTITATION TENTATIVELY IDENTIFIED COMPOUNDS SEMIVOLATILE CLEANUP OVERALL EVALUATION OF DATA	
Pest/PCB worksheets:		
VOA/SV-Pest/PCB-I Pest/PCB-IIA Pest/PCB-IIB Pest/PCB-IIC Pest/PCB-IID Pest/PCB-III Pest/PCB-IV VOA/SV-Pest/PCB-V-A VOA/SV-Pest/PCB-V-B Pest/PCB-VI Pest/PCB-VII VOA/SV-Pest/PCB-VIII VOA/SV-Pest/PCB-VIII VOA/SV-Pest/PCB-XI VOA/SV-Pest/PCB-XI Pest/PCB-XII Pest/PCB-XII Pest/PCB-XII Pest/PCB-XIII TABLE II-WORKSHEET	COMPLETE SDG FILE (CSF) AUDIT PRESERVATION AND HOLDING TIMES GC/ECD INSTRUMENT PERFORMANCE CHECK- RESOLUTION GC/ECD INSTRUMENT PERFORMANCE CHECK- RETENTION TIMES GC/ECD INSTRUMENT PERFORMANCE CHECK- ACCURACY CHECK OF INITIAL CALIBRATION GC/ECD INSTRUMENT PERFORMANCE CHECK- PESTICIDE DEGRADATION INITIAL CALIBRATION CONTINUING CALIBRATION BLANK ANALYSIS BLANK ANALYSIS SURROGATE COMPOUNDS: SPIKE RECOVERIES AND RETENTION TIME SHIFT PESTICIDE CLEANUP MATRIX SPIKE/MATRIX SPIKE DUPLICATE FIELD DUPLICATE PRECISION SENSITIVITY CHECK ACCURACY CHECK COMPOUND IDENTIFICATION SAMPLE QUANTITATION OVERALL EVALUATION OF DATA	NA (
I certify that all criteria were met for		
Signature: Carel D. Erik Sov	Name: Carol A. Erikson	<u> </u>
_		

COMPLETE SDG FILE (CSF) AUDIT

Organi	c Fractions:	SVOC					
Missin	g Information		Date Lab C	Contacted		Date Rec	<u>eived</u>
raw	data		acceptable	to client	- no a	action	taker
			1		_		
-			•				
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Validat	tor: CQE					D	ate: 8/4/01

Validator: Ca Euksor-

III. INITIAL CALIBRATION - List all analytes that are outside calibration criteria.

Date of ICAL	Instrument	Parameter	Matrix	Compound	% RSD	RRF	Samples Affected	Action
4/19/01	HP5971Q	SYOC	5V	cyclohexanone	35	OK.	5W-04, SW-09	JUJ
]						
		-						
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							· · · · · · · · · · · · · · · · · · ·	:
			<u> </u>				·	
	-							
Comments:								
							:	

Date: 8/4/01

EPA-NE - Data Validation Worksheet VOA/SV - Pest/PCB-V-A

V.	RI.	AN	٧K	AN.	ΑI	.VS	15
7 .	$\boldsymbol{\nu}$	/ L	117	CILL	α		41

List th	e blank contamination below,			Concentration	Level: Low
Sample	er:	Company: Roux Assoc.	Contacted:	Yes No	Date:
1.	Laboratory: Method, Storage	and Instrument Blanks			

Date Extracted	Date Analyzed	Parameter/ Matrix	Sample No. (Blank Type)	Instrument/ Column	Compound	Conc. (units)
4110	419/01	SVOC/AQ	SBLKIQ	HP5971Q	di-n-butylphthalate	0.1 mall
		•			B2EHP"	0.1 mg/L
						/) '
				· · · · · · · · · · · · · · · · · · ·		
	-					

2. Field: Equipment (Rinsate), Trip and Bottle Blanks

Date Extracted	Date Analyzed	Parameter/ Matrix	Sample No. (Blank Type)	Instrument/ Column	Compound	Conc. (units)
4/11/01	4/20/01	SVOC/ARZ	Field Blank	HP5971Q	cyclohexanone	O.le Mall
	' <i>'</i>				DEP	0.3/12/L
					DNBP	0.2 ma/L
					BBP	0.2 MIL
					Baenp	0.6 pt 1L
 	<u></u>					, ,,

Validator: Ca Erik Sor	Date:	8/4/01	
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3. Blank Actions - List the maximum concentrations of blank compounds.

Compound	Type of Blank	Date Blank Sampled/Originated	Max. Conc. (units)	Action Level (units)	Sample QL	Samples Affected	Action
DNBP BAEHP DEP BBP YCIONEXAMORE	Field Field	4 5 0	0.2 mg/L 0.2 mg/L 0.3 mg/L	2 Majl 6 Majl 3 Majl 2 Majl	10	5W-04, -09 5W-04, -09 5W-04, -09 MONE (NO WITS) 5W-09	Ua Ua none Ua

Comments:	
Validator: Ca Euk Sor	Date: 8/4/01

EPA-NE -	Data	Validation	Worksheet
VOA/SV -	Pest	/PCR-X	

A, SENSITATIA CHECK Machine Detection Finnt Star	Χ.	SENSITIVITY	CHECK	(Method Detection	Limit Stud	y)
--	----	--------------------	-------	-------------------	------------	----

List all compounds, surrogates, and internal standards that are outside the MDL criteria.

•	Has an appropriate MDL study been submitted with seven replicates for each compound and matrix of interest?	Y	N
•	Date of Preparation/Analysis: / _ Within 1 year?	Y	N
•	Instrument I.D.: Same as samples?	Y	N
•	Column I.D.: Same as samples?	\mathbf{Y}	N

Matrix	Compound	MDL > QL	Method QC Limits < 80% or > 120%	IS Outside Area Count and/or RT Criteria	RSD > 20%	Samples Affected	Action
				-			-
-							
_/							

Wan MDL study has not been submitted, use only the LFB results to evaluate data.

(Laboratory Fortified Blank) - List all LFB compounds, surrogates and internal standards that are outside criteria.

Has an appropriate and complete LFB been submitted at the proper frequency?

Does it contain all target compounds at the method-required QLs? (a 40 µg/L or 120 µg/L (berg acid) Y N

Was the LFB spiked with a standard from a source (vendor) independent of the calibration standard? can the!!

Matrix SBUKTO	Compound	Method QC Limits < 60% or > 140% Other:	IS Outside Area Count and/or RT Criteria	Samples Affected	Action
AO	benois acid	9%(OC 0-25	70) PJ	5W-04,-09	HJ-R
	PCP	12870 (63-1259	(a)	5W-04, -09	None

/alidator: _	Carrikson_	Date: 8/4/01
_		1 1

Spring Storm 2B



356 FARRAGUT CHOSSING DR. KNOXVILLE, TN 37922

(423) 966-8880 FAX (423) 966-8885 cerikson@trilliuminc.com

August 6, 2001

Mr. Larry McTiernan Roux Associates, Inc. 25 Corporate Drive Suite 230 Burlington, MA 01803

Subject:

STL Connecticut Report No. 7001-1290A

Downgradient Transport (Surface Water and Sediments) Investigation

Industri-Plex Site

Woburn, Massachusetts

SVOCs:

9/Surface Waters/SW-01, SW-02, SW-03, SW-04, SW-05, SW-07,

SW-08, SW-09, SW-10

(Field Duplicates: SW-01/SW-10)

Dear Mr. McTiernan:

A Tier II validation was performed on the organic analytical data for two surface water samples collected by Roux Associates, Inc. at the Industri-Plex Site in Woburn, Massachusetts and reported in the above-referenced laboratory report. Additional samples were also reported in this data package, but, per project specifications, only the results for SW-04 and SW-09 were validated. All of the samples were analyzed according to EPA Method 8270C for semivolatile organic compounds (SVOCs). For SW-04 and SW-09, the full TCL (target compound list, per the Contract Laboratory Program), with cyclohexanone added as a target analyte, was reported.

The data were evaluated as Tier II level in accordance with the "Region I EPA NE Data Validation Functional Guidelines for Evaluating Environmental Analyses" dated December 1996, and the project-specific Quality Assurance Project Plan (QAPP), dated September 14, 1999. The evaluation was based on the following parameters:

- Overall Evaluation of Data and Potential Usability Issues.
- Data Completeness.
- Preservation and Technical Holding Times.
- NA Gas Chromatography/Electron Capture Detector (GC/ECD) Instrument Performance Checks.
- * Initial and Continuing Calibration.

HOME OFFICE:



STL Connecticut Report #7001-1290A

Mr. Larry McTiernan 6 August 2001 Page 2

- Blanks.
- * Surrogate Compounds.
- Internal Standards.
- * Matrix Spike (MS)/Matrix Spike Duplicates (MSD).
- * Field Duplicates.
 - Sensitivity Check (Method Detection Limit Study or Laboratory Fortified Blank).
- NA PE Samples/Accuracy Check.
- NA Target Compound Identification.
- NA Sample Quantitation and Reported Quantitation Limits.
- NA SVOC and Pesticides Cleanup.
- NA System Performance.
- * = All criteria were met for this parameter.
- NA = Not Applicable.

Note: Worksheets for QC parameters that met criteria or are not applicable to the method will not be included as attachments to this document.

Table I summarizes the validation recommendations which were based on the following information. Table II summarizes the overall evaluation of the data with reference to the data quality objectives (DQOs) and potential usability issues.

Overall Evaluation of Data and Potential Usability Issues

The DQO for this site is to collect data of sufficient quality to allow a technically sound evaluation of sediment fate and transport, as well as impacts to surface water, in the Hall's Brook Holding Area (HBHA), located just downstream of the Industri-Plex site. The primary intended use for the data is to determine if the HBHA sediments are being entrained and/or transported out of the HBHA during storm events. The primary analytical objective is that measurements be representative of the actual site conditions and that data resulting from field sampling and analysis activities be comparable.

SVOC sample results were qualified as the result of measurement error, which in this case includes only analytical (laboratory) error. Measurement error associated with sample analysis includes method blank contamination and poor laboratory fortified blank performance. There was one major impact on data usability:

Results for bis(2-ethylhexyl)phthalate in SW-04 and SW-09 were qualified as less than
the sample-specific contract required quantitation limits (U) due to contamination in
the associated method blank.





Mr. Larry McTiernan 6 August 2001 Page 3

Data Completeness

No raw data were included in the data package. This is inconsistent with Region I guidelines, which specify that full Tier III deliverables are to be provided for all data packages no matter what level of validation is to be performed. However, the lack of raw data is acceptable to the client and does not adversely affect the Tier II validation effort. Therefore, no further action was taken on this basis.

Blanks

The following compounds were reported in the associated method blank:

Compound	Blank Type	Max Conc.	Action Limit	Action
bis(2-ethylhexyl)phthalate	Method	2 μg/L	20 μg/L	U

Results for bis(2-ethylhexyl)phthalate in SW-04 and SW-09 were qualified as less than the sample-specific contract required quantitation limits (U) due to the associated blank contamination.

No field blank was submitted to the laboratory with this data set.

Laboratory Fortified Blank

Recovery of 2,4,5-trichlorophenol (62%; QC 71-124%) was unacceptably low in the laboratory fortified blank analysis. Results for 2,4,5-trichlorophenol in SW-04 and SW-09 were qualified as estimated (UJ) on this basis.

Although acceptance limits of 0-25% were designated by the laboratory on the summary form in the data package, very poor recovery was demonstrated for benzoic acid in the laboratory fortified blank analysis, based on the validator's professional judgment (9%). The very low concentration positive results reported for benzoic acid in SW-04 and SW-09 were qualified as estimated (J) on this basis.



STL Connecticut Report #7001-1290A

Mr. Larry McTiernan 6 August 2001 Page 4

Please contact the undersigned at (865) 966-8880 if you have any questions or need further information.

Very truly yours,

TRILLIUM, INC.

Carol A. Erikson

Quality Assessment Manager

Caral a Erik Sor

CAE/ekd

Attachments: Table I: Recommendation Summary

Table II: Overall Evaluation of Data

Data Summary Key

Data Validation (DV) Worksheet

Data Summary Table

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TABLE I

INDUSTRI-PLEX SITE

STL Connecticut Report #7001-1290A

Recommendation Summary

Sample Nos.	Matrix	TCL SVOCs
SW-04	ΛQ	A^1, J^1
SW-09	ΑQ	A^1, J^1

AQ - aqueous

- A¹ = Accept the results for the sample, but qualify the results for bis(2-ethylhexyl)phthalate as not detected (U) at the sample-specific CRQL due to blank contamination.
- J¹ = Estimate (J, UJ) the results for benzoic acid and 2,4,5-trichlorophenol due to unacceptably low recoveries in the laboratory fortified blank analysis.

TABLE II

INDUSTRI-PLEX SITE STL REPORT #7001-1290A Overall Evaluation of Data

		Semivolatile Organic	Compounds (SVOCs)								
DQOs (list all DQOs)	Sampling and/or Analytical Method Appropriate Yes or No	Measurement Error		Measurement Error		Measurement Error		Measurement Error		Sampling Variability **	Potential Usability Issues
		Analytical Error	Sampling Error*								
The DQO for this site is to collect data of sufficient quality to: 1. Allow a technically sound evaluation of sediment fate and transport, as well as impacts to surface water, in the Hall's Brook Holding Area (HBHA), located just downstream of the Industri-Plex site. 2. Determine if the HBHA sediments are being entrained and/or transported out of the HBHA during storm events. 3. Be representative of the actual site conditions and comparable to other data generated in support of this project.	Analytical Method: Yes SW-846 Method 8270C Sampling Method: Yes Grab	Refer to qualifications in Table I A' J'			1. Results for bis(2-ethylhexyl)phthalate were qualified as less than the sample-specific CRQLs due to blank contamination. 2. Results for benzoic acid and 2,4,5-trichlorophenol were estimated (J, UJ) due to unacceptably low laboratory fortified blank recoveries.						

- * The evaluation of "sampling error" cannot be completely assessed in data validation.
- ** Sampling variability is not assessed in data validation.

DATA SUMMARY KEY ORGANIC DATA VALIDATION

The associated numerical value is an estimated quantity.

J

- R = The data are unusable (compound may or may not be present). Resampling and reanalysis are necessary for verification. The R replaces the numerical value or sample quantitation limit.

 U = The compound was analyzed for, but not detected. The associated numerical value is the sample quantitation limit or the adjusted sample quantitation limit.
- UJ = The compound was analyzed for, but not detected. The associated numerical value is the estimated sample quantitation limit.

DATA SUMMARY TABLE - TCL SEMIVOLATILE ORGANICS 1 WATER SAMPLES (ug/L)

Site Name: Industri-Plex STL Report #7001-1290A

Sample Number	SW-04	SW-09					
Lab ID	011290A-04	011290A-08					
Dilution Factor*	1.00	1.18					
Date Sampled	24-May-01	24-May-01				!	
Date Extracted	30-May-01	30-May-01					
Date Analyzed	6-Jun-01	6-Jun-01	 .				
QL**							
10 Cyclohexanone		35		- •			
10 Phenol						!	
10 bis(2-Chloroethyl)ether		+					
10 2-Chlorophenol				· ·	·		:
10 1,3-Dichlorobenzene							
10:1,4-Dichlorobenzene				· · · · · · · · · · · · · · · · · · ·			
10 Benzyl alcohol	1	•			· · · · · · · · · · · · · · · · · · ·		
10 1,2-Dichlorobenzene		•		• • • •	- ,		:
10 2-Methylphenol			• • • •	· •		· · · · · · · · · · · · · · · · · · ·	·····
10 bis(2-chloroisopropyl)ether				•			
10 4-Methylphenol		· · ·					
10 : N-Nitroso-di-n-propylamine							
10 Hexachloroethane			· ——- · · · ·				
10 Nitrobenzene				• • • • • • • • • • • • • • • • • • • •		 	· · · · ·
10 Isophorone	· · · · · · · · · · · · · · · · · · ·						
10 2-Nitrophenol	· • · · · · · · · · · · · · · · · · · ·		•—			1	·· ······· ·· · · · · · · · ·
10 2,4-Dimethylphenol		· · · · · · · · · · · · · · · · · · ·			• • • • • • • • • • • • • • • • • • • •	·	······································
50 Benzoic acid	1 1	0.9 J					
10 bis(2-Chloroethoxy)methane	.i				•		· · · · · · · · · · · · · · · · · · ·
10 bis(2-Chloroptenoxy)methane 10 2,4-Dichlorophenol			;				
	 	• • • • • •	•				
10 1,2,4-Trichlorobenzene			•	•		- +	· · · · · · · · · · · · · · · · · · ·
* includes adjustment for use of a sar	,				Roux SedTranspo		

^{*} includes adjustment for use of a sample volume slightly smaller than 1000 mL

[\]Roux SedTransport\1290SV

^{**} blank spaces mean the analyte was not detected; sample-specific CRQLs are equal to unadjusted CRQL times the DF

DATA SUMMARY TABLE - TCL SEMIVOLATILE ORGANICS 2 WATER SAMPLES (ug/L)

Site Name: Industri-Plex

STL Report #7001-1290A

Sample Number	SW-04	SW-09		-				!
Lab ID	011290A-04	011290A-08	→ ·		•	••	• •	
Dilution Factor*	1.00	1.18	1					
Date Sampled	24-May-01	24-May-01	1)					
Date Extracted	30-May-01	30-May-01						
Date Analyzed	6-Jun-01	6-Jun-01	**					
CRQL**								
10 4-Chloroaniline						·		The state of the s
10 Hexachlorobutadiene	:		•					
10 4-Chloro-3-methylphenol	- i		•	, .	•	•		
10 2-Methylnaphthalene	1	:						
10 Hexachlorocyclopentadiene				* *	• •	•		
10 2,4,6-Trichlorophenol		• ••		•				
50 2,4,5-Trichlorophenol	UJ	UJ						1
10 2-Chloronaphthalene		•	•		·	•	,	
50 2-Nitroaniline		• • • • •	•		•			
10 Dimethylphthalate		•	•	. ,	•			
10 Acenaphthylene			•	•	•			
10 2,6-Dinitrotoluene		•	•		•	ŕ		
50 3-Nitroaniline		•	•		•	ŕ	,	
10 Acenaphthene			•		•			
50 2,4-Dinitrophenol			•		•			
50 4-Nitrophenol					•	•		· · · · · · · · · · · · · · · · · · ·
10 Dibenzofuran		•	•			·	:	
10 2,4-Dinitrotoluene		• ·	•			•	, .	
10 Diethylphthalate	0.1 J	0.3 J	•		•	•		
10 4-Chlorophenyl-phenylether		• • •	•		•	•	, ,	
10 Fluorene		• · · · · · · · · · · · · · · · · · · ·	•	•	•	•		
50 4-Nitroaniline			•		-	•		
	+		•					

^{*} includes adjustment for use of a sample volume slightly smaller than 1000 ml.

\Roux SedTransport\1290SV

^{**} blank spaces mean the analyte was not detected; sample-specific CRQLs are equal to unadjusted CRQL times the DF

DATA SUMMARY TABLE - TCL SEMIVOLATILE ORGANICS 3 WATER SAMPLES (ug/L)

STL Report #7001-1290A Site Name: Industri-Plex Sample Number SW-04 SW-09 Lab ID 011290A-04 011290A-08 Dilution Factor* 1.00 1.18 24-May-01 24-May-01 Date Sampled 30-May-01 Date Extracted 30-May-01 Date Analyzed 6-Jun-01 6-Jun-01 CRQL** 50 4.6-Dinitro-2-methylphenol 10 N-Nitrosodiphenvlamine 10 4-Bromophenyl-phenylether 10 Hexachlorobenzene 50 Pentachlorophenol 10 Phenanthrene 10 Anthracene 10 Di-n-butylphthalate 0.2 J 0.2 J 10 Fluoranthene 0.2 J 10 Pyrene 0.2 J 10 Butylbenzylphthalate 20 3,3'-Dichlorobenzidine 10 Benzo(a)anthracene 10 Chrysene 10 bis(2-Ethylhexyl)phthalate 10 U 12 U 10 Di-n-octylphthalate 10 Benzo(b)fluoranthene 10 Benzo(k)fluoranthene 10 Benzo(a)pyrene 10 Indeno(1,2,3-cd)pyrene 10 : Dibenz(a,h)anthracene 10 Benzo(g,h,i)perylene

Page 3 of 3

\Roux SedTransport\1290SV

^{*} includes adjustment for use of a sample volume slightly smaller than 1000 mL

^{**} blank spaces mean the analyte was not detected; sample-specific CRQLs are equal to unadjusted CRQL times the DF

Site Name -	Industri-	Plex
Reference N	o	

REGION I ORGANIC DATA VALIDATION

REGION / Ondimite Di	
The following data package has been validated:	
Lab Name STL Connecticut Case/Project No. SDG No. 7001-1290A No. of Samples/Matrix	SOW/Method No. EPA 8270C Sampling Date(s) 5/24/01 Shipping Date(s) 5/24/01 Date Rec'd by lab 5/25/01
Traffic Report Sample Nos. 3W-01, SW-03 SW-07, SW-08, SW-0	9, 5W-03, 5W-04, 5W-05,
Trip Blank No	
The Region I, EPA-NE Data Validation Functional Gurevision 1996 was used to evaluate the data a Functional Guidelines were used to evaluate the data and criteria from EPA approved QAPjP or amendment to G	and/or approved modifications to the EPA-NE d are attached to this cover page: (attach modified
A Tier II or Tier III evaluation was used to validate the partial Tier III was used, then identify samples, parameters and the samples of the	eters, etc. that received partial Tier III validation
SW-04 and SW-09 o	nly .
The data were evaluated based upon the following para	
 Overall Evaluation of Data Data Completeness (CSF Audit - Tier I) Preservation & Technical Holding Times GC/MS & GC/ECD Instrument Performance Check Initial & Continuing Calibrations Blanks Surrogate Compounds Internal Standards Matrix Spike/Matrix Spike Duplicate 	 Field Duplicates Sensitivity Check PE Samples/Accuracy Check Target Compound Identification Compound Quantitation and Reported Quantitation Limits TICs Semivolatile and Pesticide/PCB Cleanup System Performance
Region I Definitions and Qualifiers:	
A - Acceptable Data J - Numerical value associated with compound is an R - The data are rejected as unusable. The R replaces U - Compound not detected at that numerical sample UJ - The sample quantitation limit is an estimated quanTB, BB, EB - Compound detected in aqueous trip blank associated with soil/sediment samples.	the numerical value or sample quantitation limit. quantitation limit. ntity.
Validator's Name <u>Parel a Eurisor</u> Company Na Date Validation Started 8/4/01	nme Trillium TMCPhone Number 8659668880
Date Validation Started 8/4/01	Date Validation Completed 8/6/01

Data Validation Worksheet Cover Page - Page 2

Check if all criteria are met and no hard copy worksheet provided. Indicate NA if worksheet is not applicable to analytical method. Note: there is no standard worksheet for System Performance, however, the validator must document all system performance issues in the Data Validation Memorandum.

VOA/SV worksheets:

VOA/SV-Pest/PCB-I VOA/SV-III VOA/SV-III VOA/SV-III VOA/SV-III VOA/SV-III VOA/SV-III VOA/SV-III VOA/SV-III VOA/SV-III VOA/SV-III VOA/SV-Pest/PCB-V-A VOA/SV-Pest/PCB-V-B VOA-VI SV-VI VOA/SV-Pest/PCB-V-B VOA-VI SV-VII VOA/SV-Pest/PCB-VIII VOA/SV-Pest/PCB-XII VOA/SV-Pest/PCB-XI VOA/SV-Pest/PCB-XI VOA/SV-Pest/PCB-XI VOA/SV-Pest/PCB-XII VOA/SV-Pest/PCB-XIII PEST/PCB-IIII PEST/PCB-IIII PEST/PCB-IIII PEST/PCB-IIII PEST/PCB-IIII PEST/PCB-IIII PEST/PCB-IIII PEST/PCB-IIII PEST/PCB-IIII PEST/PCB-III	NO MEN Described	COMPLETE SDG FILE (CSF) AUDIT	
VOA/SV-II VOA/SV-III VOA/SV-1V VOA/SV-PES/PCB-V-A VOA/SV-PES/PCB-V-A VOA/SV-PES/PCB-V-B BLANK ANALYSIS VOA-VI VOA/SV-PES/PCB-V-B BLANK ANALYSIS VOA-VI VOA/SV-PES/PCB-V-B BLANK ANALYSIS VOA-VII VOA/SV-PES/PCB-VIII VOA/SV-PES/PCB-VIII VOA/SV-PES/PCB-X VOA/SV-PES/PCB-XII PES/PCB-IIA GC/ECD INSTRUMENT PERFORMANCE CHECK-RESOLUTION PES/PCB-IIC GC/ECD INSTRUMENT PERFORMANCE CHECK-RESOLUTION PES/PCB-III PES/PCB-II		PRESERVATION AND HOLDING TIMES	/
VOA/SV-1II VOA/SV-Pest/PCB-V-A VOA/SV-Pest/PCB-V-B VOA/SV-Pest/PCB-V-B VOA/SV-Pest/PCB-V-B VOA/SV-Pest/PCB-V-B VOA/SV-Pest/PCB-V-B VOA/SV-Pest/PCB-V-III VOA/SV-Pest/PCB-VIII VOA/SV-Pest/PCB-XII VOA/SV-Pest/PCB-XII VOA/SV-Pest/PCB-XIII VOA/SV-Pest/PCB-XIII VOA/SV-Pest/PCB-XIII VOA/SV-Pest/PCB-XIII VOA/SV-Pest/PCB-XIII VOA/SV-Pest/PCB-XIII VOA/SV-Pest/PCB-XIII VOA/SV-V-PEST/PCB-XIII VOA/SV-V-PEST/PCB-XIII VOA/SV-V-PEST/PCB-XIII VOA/SV-V-PEST/PCB-XIII VOA/SV-V-PEST/PCB-XIII VOA/SV-V-PEST/PCB-XIII VOA/SV-XV TABLE II-WORKSHEET Pest/PCB-IIA Pest/PCB-IIA Pest/PCB-IIA Pest/PCB-III PEst/PCB-III PEst/PCB-III PEst/PCB-III PEst/PCB-III PEst/PCB-			/- -
VOA/SV-Pes/PCB-V-A VOA/SV-Pes/PCB-V-B VOA/SV-Pes/PCB-V-B VOA-VI VOA/SV-Pes/PCB-V-B VOA-VI VOA/SV-Pes/PCB-V-B VOA/SV-VII VOA/SV-VII VOA/SV-VII VOA/SV-VII VOA/SV-Pes/PCB-VIII VOA/SV-Pes/PCB-XI VOA/SV-Pes/PCB-XI VOA/SV-Pes/PCB-XI VOA/SV-Pes/PCB-XI VOA/SV-Pes/PCB-XI VOA/SV-Pes/PCB-XII VOA/SV-Pes/PCB-XII VOA/SV-Pes/PCB-XII VOA/SV-Pes/PCB-XII VOA/SV-Pes/PCB-XII VOA/SV-Pes/PCB-XII VOA/SV-Pes/PCB-XII VOA/SV-Pes/PCB-XII VOA/SV-Pes/PCB-XII VOA/SV-Pes/PCB-XII VOA/SV-Pes/PCB-XII VOA/SV-Pes/PCB-XII VOA/SV-Pes/PCB-XII VOA/SV-XIV TENTATIVELY IDENTIFIED COMPOUNDS NA/A TABLE II-WORKSHEET Pes/PCB-IIA Pes/PCB-IIA Pes/PCB-IIB GC/ECD INSTRUMENT PERFORMANCE CHECK-RESOLUTION Pes/PCB-IIC GC/ECD INSTRUMENT PERFORMANCE CHECK-RESOLUTION Pes/PCB-III NITIAL CALIBRATION CONTINUING CALIBRATION PES/PCB-III PES/PCB-III PES/PCB-III NITIAL CALIBRATION CONTINUING CALIBRATION PES/PCB-III PES/PCB-III PES/PCB-III NITIAL CALIBRATION CONTINUING CALIBRATION PES/PCB-III PES/PCB-III PES/PCB-III NA/A COMPOUND IDENTIFICATION PES/PCB-III PES/PCB-III PES/PCB-III NA/A COURACY CHECK PES/PCB-III PES/PCB-III PES/PCB-III NA/A COURACY CHECK PES/PCB-III PES/PCB-III PES/PCB-III PES/PCB-III NA/A COURACY CHECK COMPOUND IDENTIFICATION PES/PCB-III PES/PCB-III PES/PCB-III NA/A PES/PCB-III NA/A PES/PCB-III NA/A PES/PCB-III NA/A PES/PCB-III NA/A PES/PCB-III			
VOA/SV-Pest/PCB-V-A VOA/SV-Pest/PCB-V-B BLANK ANALYSIS VOA-VI SV-VI SV-VI SV-VI SV-VI SV-SURROGATE SPIKE RECOVERIES VOA/SV-Pest/PCB-VIII VOA/SV-Pest/PCB-VIII VOA/SV-Pest/PCB-VIII VOA/SV-Pest/PCB-X VOA/SV-Pest/PCB-X VOA/SV-Pest/PCB-X VOA/SV-Pest/PCB-XI VOA/SV-Pest/PCB-XI VOA/SV-Pest/PCB-XII VOA/SV-Pest/PCB-XII VOA/SV-Pest/PCB-XIII VOA/SV-Pest/PCB-XIII VOA/SV-Pest/PCB-XIII VOA/SV-Pest/PCB-XIII VOA/SV-Pest/PCB-XIII VOA/SV-Pest/PCB-XIII VOA/SV-Pest/PCB-XIII VOA/SV-Pest/PCB-XIII VOA/SV-Pest/PCB-XIII VOA/SV-Pest/PCB VOA/SV-Pest/PCB VOA/SV-Pest/PCB VOA/SV-Pest/PCB VOA/SV-Pest/PCB VOA/SV-Pest/PCB VOA/SV-Pest/PCB VOA/SV-Pest/PCB VOA/SV-Pest/PCB VOA/SV-Pest/PCB VOA/SV-Pest/PCB-II Pest/PCB-IIC GC/ECD INSTRUMENT PERFORMANCE CHECK-RETENTION TIMES Pest/PCB-III NITIAL CALIBRATION CONTINUING CALIBRATION PEST/PCB-III Pest/PCB-III NITIAL CALIBRATION CONTINUING CALIBRATION PEST/PCB-V-B PEST/PCB-V-B PEST/PCB-V-B PEST/PCB-V-B PEST/PCB-V-II PESTICIDE DEGRADATION VOA/SV-Pest/PCB-V-A BLANK ANALYSIS SURROGATE COMPOUNDS: SPIKE RECOVERIES AND RETENTION TIME SHIFT PESTICIDE CLEANUP VOA/SV-Pest/PCB-XI VOA/SV-Pest/PCB-XI ACCURACY CHECK PESTICIDE CLEANUP VOA/SV-Pest/PCB-XI ACCURACY CHECK PESTICIDE CLEANUP VOA/SV-Pest/PCB-XI ACCURACY CHECK PESTICIDE CLEANUP VOA/SV-Pest/PCB-XI ACCURACY CHECK PESTICIDE CLEANUP VOA/SV-Pest/PCB-XI ACCURACY CHECK PESTICIDE CLEANUP VOA/SV-Pest/PCB-XI ACCURACY CHECK PESTICIDE CLEANUP VOA/SV-Pest/PCB-XII ACCURACY CHECK PESTICIDE CLEANUP VOA/SV-Pest/PCB-XII ACCURACY CHECK PESTICIDE CLEANUP VOA/SV-Pest/PCB-XII ACCURACY CHECK PESTICIDE CLEANUP VOA/SV-Pest/PCB-XII ACCURACY CHECK PESTICIDE CLEANUP VOA			/
VOA.SV.Pest/PCB-V-B VOA.VI VOA.VI VOA SURROGATE SPIKE RECOVERIES SV-VI VOA.SV.Pest/PCB-VIII NTERNAL STANDARD PERFORMANCE VOA/SV.Pest/PCB-VIII VOA/SV.Pest/PCB-XI VOA/SV.Pest/PCB-XI VOA/SV.Pest/PCB-XII VOA/SV.Pest/PCB-XII VOA/SV.Pest/PCB-XIII VOA/SV.Pest/PCB-XIII VOA/SV.Pest/PCB-XIII VOA/SV.Pest/PCB-XIII VOA/SV.Pest/PCB-XIII VOA/SV.Pest/PCB-XIII VOA/SV.YV SEMIVOLATILE CLEANUP VOA/SV.XV SEMIVOLATILE CLEANUP VOA/SV.Pest/PCB VOA/SV-Pest/PCB VII Pest/PCB-III Pest/PCB-III Pest/PCB-III Pest/PCB-VII Pest/PCB-VII VOA/SV-Pest/PCB-V-A VOA/SV-Pest/PCB-V-B Pest/PCB-VII VOA/SV-Pest/PCB-V-B Pest/PCB-VII VOA/SV-Pest/PCB-X VOA/SV-Pest/PCB-X VOA/SV-Pest/PCB-X VOA/SV-Pest/PCB-X VOA/SV-Pest/PCB-X VOA/SV-Pest/PCB-X VOA/SV-Pest/PCB-X VOA/SV-Pest/PCB-X VOA/SV-Pest/PCB-X VOA/SV-Pest/PCB-XII PESTICIDE CLEANUP VOA/SV-Pest/PCB-XII PESTICIDE CLEANUP VOA/SV-Pest/PCB-XII VOA/SV-Pest/PCB-XIII COMPOUND IDENTIFICATION VOA/SV-Pest/PCB-XIII PESTICIDE CLEANUP VOA/SV-Pest/PCB-XIII PESTICIDE CLEANUP VOA/SV-Pest/PCB-XIII VOA/SV-Pest/PCB-XIII COMPOUND IDENTIFICATION VOA/SV-Pest/PCB-XIII VOA/SV-Pest/PCB-XIII COMPOUND IDENTIFICATION VOA/SV-Pest/PCB-XIII VOA/SV-PE		# # - F	
VOA-VII SV-VI SV-VI SV-VI SV-VI SV-VII VOA/SV-Pest/PCB-VIII VOA/SV-Pest/PCB-VIII VOA/SV-Pest/PCB-IX VOA/SV-Pest/PCB-X VOA/SV-Pest/PCB-X VOA/SV-Pest/PCB-X VOA/SV-Pest/PCB-XII VOA/SV-Pest/PCB-XII VOA/SV-Pest/PCB-XIII VOA/SV-Pest/PCB-XIII VOA/SV-Pest/PCB-XIII VOA/SV-Pest/PCB-XIII VOA/SV-Pest/PCB-XIII VOA/SV-Pest/PCB-XIII VOA/SV-Pest/PCB-XIII VOA/SV-Pest/PCB-XIII VOA/SV-XV SEMIVOLATILE CLEANUP VOA/SV-XV SEMIVOLATILE CLEANUP NAA Pest/PCB worksheets: VOA/SV-Pest/PCB VOA/SV-Pest/PCB VOA/SV-Pest/PCB VOA/SV-Pest/PCB-II Pest/PCB-IIB GC/ECD INSTRUMENT PERFORMANCE CHECK-RETENTION TIMES Pest/PCB-IIC GC/ECD INSTRUMENT PERFORMANCE CHECK-ACCURACY CHECK OF INITIAL CALIBRATION Pest/PCB-III PESt/PCB-III NINTIAL CALIBRATION PEST/PCB-III PEST/PCB-V-A VOA/SV-Pest/PCB-V-B PEST/CB-V-B VOA/SV-Pest/PCB-V-B BLANK ANALYSIS SURROGATE SPIKE RECOVERIES V SURROGATE SPIKE RECOVERIES V SURROGATE SPIKE RECOVERIES V/ MATTIX SPIKE DUPLICATE V/ MATTIX SPIKE DUPLICATE V/ MAA MACURACY CHECK MAA MAA MAA MAA MAA MAA MAA MAA MAA MA		···	
SV-VI VOA/SV-POSI/PCB-VIII INTERNAL STANDARD PERFORMANCE VOA/SV-PESI/PCB-IX INTERNAL STANDARD PERFORMANCE VOA/SV-PESI/PCB-IX VOA/SV-PESI/PCB-IX VOA/SV-PESI/PCB-XI VOA/SV-PESI/PCB-XII VOA/SV-PESI/PCB-XII VOA/SV-PESI/PCB-XII VOA/SV-PESI/PCB-XII VOA/SV-PESI/PCB-XIII VOA/SV-PESI/PCB-XIII VOA/SV-PESI/PCB-XIII VOA/SV-PESI/PCB-XIII VOA/SV-PESI/PCB-XIII VOA/SV-PESI/PCB-XIII VOA/SV-PESI/PCB-XIII VOA/SV-PESI/PCB-XIII VOA/SV-PESI/PCB-XIII VOA/SV-PESI/PCB-II PESI/PCB worksheets: VOA/SV-PESI/PCB-II PESI/PCB-IIA GC/ECD INSTRUMENT PERFORMANCE CHECK-RETENTION TIMES PESI/PCB-IIC GC/ECD INSTRUMENT PERFORMANCE CHECK-RETENTION TIMES PESI/PCB-III PESI/PCB-III PESI/PCB-III PESI/PCB-III PESI/PCB-III PESI/PCB-III PESI/PCB-III PESI/PCB-III PESI/PCB-III PESI/PCB-III PESI/PCB-III PESI/PCB-III PESI/PCB-III PESI/PCB-III PESI/PCB-III PESI/PCB-III PESI/PCB-III PESI/PCB-VI VOA/SV-PESI/PCB-V-A VOA/SV-PESI/PCB-V-B BLANK ANALYSIS SPIKE RECOVERIES AND RETENTION TIME SHIFT PESI/CDB-VI VOA/SV-PESI/PCB-XI VOA/SV-PESI/PCB-XI PESI/PCB-XI PESI/PCB-XI PESI/PCB-XII SAMPLE QUANTITATION TABLE II-WORKSHEET VOA/SV-PESI/PCB-XII SAMPLE QUANTITATION VOA/SV-PESI/PCB-XII SAMPLE QUANTITATION VOA/SV-PESI/PCB-XIII SAMPLE QUANTITATION VOA/SV-PESI/PCB-XIII SAMPLE QUANTITATION VOA/SV-PESI/PCB-XIII SAMPLE QUANTITATION VOA/SV-PESI/PCB-XIII SAMPLE QUANTITATION VOA/SV-PESI/PCB-XIII SAMPLE QUANTITATION VOA/SV-PESI/PCB-XIII SAMPLE QUANTITATION VOA/SV-PESI/PCB-XIII SAMPLE QUANTITATION VOA/SV-PESI/PCB-XIII SAMPLE QUANTITATION VOA/SV-PESI/PCB-XIII SAMPLE QUANTITATION VOA/SV-PESI/PCB-XIII SAMPLE QUANTITATION VOA/SV-PESI/PCB-XIII SAMPLE QUANTITATION VOA/SV-PESI/PCB-XIII VOA/SV-PESI/PCB-			
VOA/SV-Pest/PCB-VIII VOA/SV-Pest/PCB-VIII VOA/SV-Pest/PCB-X VOA/SV-Pest/PCB-X VOA/SV-Pest/PCB-X VOA/SV-Pest/PCB-X VOA/SV-Pest/PCB-X VOA/SV-Pest/PCB-XII VOA/SV-Pest/PCB-XIII VOA/SV-Pest/PCB-XIII VOA/SV-Pest/PCB-XIII VOA/SV-Pest/PCB-XIII VOA/SV-Pest/PCB-XIII VOA/SV-Pest/PCB-XIII VOA/SV-Pest/PCB-XIII VOA/SV-Pest/PCB-XIII VOA/SV-Y-Pest/PCB-XIII VOA/SV-Pest/PCB-XIII VOA/SV-Pest/PCB-XIII VOA/SV-Pest/PCB-XIII VOA/SV-Pest/PCB-XIII PEST/PCB worksheets: VOA/SV-Pest/PCB-II Pest/PCB-IIA Pest/PCB-IIB GC/ECD INSTRUMENT PERFORMANCE CHECK-RETENTION TIMES Pest/PCB-III Pest/PCB-III Pest/PCB-III Pest/PCB-III Pest/PCB-III Pest/PCB-III Pest/PCB-III Pest/PCB-III Pest/PCB-III Pest/PCB-III Pest/PCB-III Pest/PCB-III Pest/PCB-III Pest/PCB-III Pest/PCB-III Pest/PCB-III Pest/PCB-III Pest/PCB-III Pest/PCB-VI VOA/SV-Pest/PCB-V-A VOA/SV-Pest/PCB-V-B BLANK ANALYSIS Pest/PCB-VI SURROGATE COMPOUNDS: SPIKE RECOVERIES AND RETENTION TIME SHIFT Pest/PCB-VIII VOA/SV-Pest/PCB-XII VOA/SV-Pest/PCB-XII POA/SV-Pest/PCB-XII VOA/SV-Pest/PCB-XII VOA/SV-Pest/PCB-XII ACCURACY CHECK VOA/SV-Pest/PCB-XII VOA/SV-Pest/PCB-XII ATRRET SPIKE/MATRIX SPIKE DUPLICATE PEST/CIDE CLEANUP MATRIX SPIKE/MATRIX SPIKE DUPLICATE PEST/PCB-XII ACCURACY CHECK VOA/SV-Pest/PCB-XII ACCURACY CHECK ACCURACY CHECK VOA/SV-Pest/PCB-XII ACCURACY CHECK ACCURACY C			NA
VOA/SV-Pest/PCB-IX VOA/SV-Pest/PCB-IX VOA/SV-Pest/PCB-XI VOA/SV-Pest/PCB-XI VOA/SV-Pest/PCB-XI VOA/SV-Pest/PCB-XI VOA/SV-Pest/PCB-XII VOA/SV-Pest/PCB-XIII VOA/SV-Pest/PCB-XIII VOA/SV-Pest/PCB-XIII VOA/SV-Pest/PCB-XIII VOA/SV-Pest/PCB-XIII VOA/SV-Pest/PCB-XIII VOA/SV-Y-Pest/PCB-XIII VOA/SV-XV TENTATIVELY IDENTIFIED COMPOUNDS NA NA NA NA VOA/SV-XV TENTATIVELY IDENTIFIED COMPOUNDS NA NA PEST/PCB worksheets: VOA/SV-Pest/PCB VOA/SV-Pest/PCB-I Pest/PCB-IIA GC/ECD INSTRUMENT PERFORMANCE CHECK-RETENTION TIMES Pest/PCB-IIC GC/ECD INSTRUMENT PERFORMANCE CHECK-RETENTION TIMES Pest/PCB-III Pest/PCB-III Pest/PCB-III Pest/PCB-III Pest/PCB-III Pest/PCB-III Pest/PCB-III Pest/PCB-III Pest/PCB-III Pest/PCB-VII Pest/PCB-VI VOA/SV-Pest/PCB-V-A VOA/SV-Pest/PCB-V-B BLANK ANALYSIS Pest/PCB-VII PEST/CCB-VII VOA/SV-Pest/PCB-XII VOA/SV-Pest/PCB-XII VOA/SV-Pest/PCB-XIII VOA/SV-PEST/PCB-X			
VOA/SV-Pest/PCB-IX VOA/SV-Pest/PCB-X SENSITIVITY CHECK VOA/SV-Pest/PCB-XII ACCURACY CHECK VOA/SV-Pest/PCB-XIII TARGET COMPOUND IDENTIFICATION VOA/SV-PEST/PCB-XIII SAMPLE QUANTITATION VOA/SV-PEST/PCB-XIII SAMPLE QUANTITATION VOA/SV-YAV TENTATIVELY IDENTIFIED COMPOUNDS NA VOA/SV-XV SEMIVOLATILE CLEANUP VOA/SV-PEST/PCB COMPLETE SDG FILE (CSF) AUDIT VOA/SV-PEST/PCB PRESERVATION AND HOLDING TIMES PEST/PCB-IIA GC/ECD INSTRUMENT PERFORMANCE CHECK-RESOLUTION PEST/PCB-IIC GC/ECD INSTRUMENT PERFORMANCE CHECK-RETENTION TIMES PEST/PCB-IIC GC/ECD INSTRUMENT PERFORMANCE CHECK-PEST/ICIDE DEGRADATION PEST/PCB-III INITIAL CALIBRATION PEST/PCB-III INITIAL CALIBRATION PEST/PCB-III INITIAL CALIBRATION PEST/PCB-III INITIAL CALIBRATION VOA/SV-PEST/PCB-V-B BLANK ANALYSIS PEST/PCB-VI SURROGATE COMPOUNDS: SPIKE RECOVERIES AND RETENTION TIME SHIFT PEST/PCB-VII PEST/ICIDE CLEANUP WOA/SV-PEST/PCB-XI FIELD DUPLICATE VOA/SV-PEST/PCB-XI FIELD DUPLICATE VOA/SV-PEST/PCB-XI SENSITIVITY CHECK VOA/SV-PEST/PCB-XI COMPOUND IDENTIFICATION TABLE II-WORKSHEET OVERALL EVALUATION OF DATA			
VOA/SV-Pest/PCB-X VOA/SV-Pest/PCB-XI VOA/SV-Pest/PCB-XII VOA/SV-Pest/PCB-XIII VOA/SV-Pest/PCB-XIII VOA/SV-PEST/PCB-XIII VOA/SV-PEST/PCB-XIII VOA/SV-PEST/PCB-XIII VOA/SV-PEST/PCB-XIII VOA/SV-PEST/PCB-XIII VOA/SV-PEST/PCB-XIII VOA/SV-PEST/PCB-XIII VOA/SV-PEST/PCB-XIII VOA/SV-PEST/PCB-XIII VOA/SV-PEST/PCB-II PEST/PCB worksheets: VOA/SV-PEST/PCB-II PEST/PCB-IIA GC/ECD INSTRUMENT PERFORMANCE CHECK-RESOLUTION PEST/PCB-IIC GC/ECD INSTRUMENT PERFORMANCE CHECK-RETENTION TIMES PEST/PCB-III GC/ECD INSTRUMENT PERFORMANCE CHECK-ACCURACY CHECK OF INITIAL CALIBRATION PEST/PCB-III INITIAL CALIBRATION PEST/PCB-III PEST/PCB-IV VOA/SV-PEST/PCB-V-A BLANK ANALYSIS PEST/PCB-VII PEST/PCB-VII VOA/SV-PEST/PCB-V-B BLANK ANALYSIS PEST/PCB-VII VOA/SV-PEST/PCB-X VOA/SV-PEST/PCB-X VOA/SV-PEST/PCB-X VOA/SV-PEST/PCB-X VOA/SV-PEST/PCB-X VOA/SV-PEST/PCB-X VOA/SV-PEST/PCB-X VOA/SV-PEST/PCB-X VOA/SV-PEST/PCB-X VOA/SV-PEST/PCB-X VOA/SV-PEST/PCB-XIII VOA/SV-PEST/PCB-XIII SAMPLE QUANTITATION TABLE II-WORKSHEET SENSITIVITY CHECK OMPOUND IDENTIFICATION PARAMETER TO ACCURACY CHECK OF INTIAL COMPOUND IDENTIFICATION PEST/PCB-XIII SAMPLE QUANTITATION VOA/SV-PEST/PCB-XIII SAMPLE QUANTITATION VOA/SV-PEST/PCB-XIII VOA/SV-PEST/PCB-			
VOA/SV-Pest/PCB-XII VOA/SV-Pest/PCB-XII TARGET COMPOUND IDENTIFICATION NA VOA/SV-Pest/PCB-XIII VOA/SV-PSI/PCB-XIII VOA/SV-XIV TENTATIVELY IDENTIFIED COMPOUNDS NA VOA/SV-XV SEMIVOLATILE CLEANUP TABLE II-WORKSHEET VOA/SV-Pest/PCB VOA/SV-Pest/PCB VOA/SV-Pest/PCB-I PEST/PCB-IIA Pest/PCB-IIA Pest/PCB-IIB GC/ECD INSTRUMENT PERFORMANCE CHECK-RETOLITION TIMES Pest/PCB-IIC Pest/PCB-IID GC/ECD INSTRUMENT PERFORMANCE CHECK-ACCURACY CHECK OF INITIAL CALIBRATION Pest/PCB-III PEST/PCB-III PEST/PCB-III PEST/PCB-III PEST/PCB-III PEST/PCB-III PEST/PCB-III PEST/PCB-III PEST/PCB-V-A VOA/SV-Pest/PCB-V-A VOA/SV-Pest/PCB-V-B PEST/PCB-VI SURROGATE COMPOUNDS: SPIKE RECOVERIES AND RETENTION TIME SHIFT PEST/PCB-VI VOA/SV-Pest/PCB-X VOA/SV-Pest/PCB-X VOA/SV-Pest/PCB-X VOA/SV-Pest/PCB-X VOA/SV-Pest/PCB-X VOA/SV-Pest/PCB-X VOA/SV-Pest/PCB-X VOA/SV-Pest/PCB-X VOA/SV-Pest/PCB-XIII COMPOUND IDENTIFICATION JAPA VOA/SV-PEST/PCB-XIII SAMPLE QUANTITATION JAPA VOA/SV-PEST/PCB-XIII COMPOUND IDENTIFICATION JAPA VOA/SV-PEST/PCB-XIII SAMPLE QUANTITATION JAPA VOA/SV-PEST/PCB-XIII SAMPLE QUANTITATION JAPA VOA/SV-PEST/PCB-XIII SAMPLE QUANTITATION JAPA VOA/SV-PEST/PCB-XIII VOA/SV-PEST/PCB-			
VOA/SV-Pest/PCB-XIII VOA/SV-Pest/PCB-XIII VOA/SV-Pest/PCB-XIII VOA/SV-Pest/PCB-XIII VOA/SV-Pest/PCB-XIII VOA/SV-XV TENTATIVELY IDENTIFIED COMPOUNDS NAF VOA/SV-XV SEMIVOLATILE CLEANUP OVERALL EVALUATION OF DATA Pest/PCB worksheets: VOA/SV-Pest/PCB-I Pest/PCB-IIA Pest/PCB-IIB Pest/PCB-IIB Pest/PCB-IIC Pest/PCB-IID Pest/PCB-III Pest/PCB-III Pest/PCB-III Pest/PCB-III Pest/PCB-III Pest/PCB-III Pest/PCB-III Pest/PCB-IV VOA/SV-Pest/PCB-V-A VOA/SV-Pest/PCB-V-B Pest/PCB-VI Pest/PCB-VI SURROGATE COMPOUNDS SPIKE RECOVERIES AND RETENTION TIME SHIFT PESTICIDE CLEANUP VOA/SV-Pest/PCB-X VOA/SV-Pest/PCB-X VOA/SV-Pest/PCB-X VOA/SV-Pest/PCB-X VOA/SV-Pest/PCB-X VOA/SV-Pest/PCB-X VOA/SV-Pest/PCB-X VOA/SV-Pest/PCB-XIII VOA/SV-PEST/PCB-XIII VOA/SV-PEST/PCB-XIII VOA/SV-PEST/PCB-XIII VOA/SV-PEST/PCB-XIII VOA/SV-PEST/PCB-XIII VOA/SV-PEST/PCB-XIII VOA/SV-PEST/PCB-XIII VOA/SV-PEST/PCB-XIII VOA/SV-PEST/PCB-XIII VOA/SV-PEST/PCB-XIII VOA/SV-PEST/PCB-XIII VOA/SV-PEST/PCB-XIII VOA/SV-PEST/P			
VOA/SV-Pest/PCB-XII VOA/SV-Pest/PCB-XIII SAMPLE QUANTITATION NA VOA/SV-Pest/PCB-XIII VOA/SV-XIV TENTATIVELY IDENTIFIED COMPOUNDS NA NA Pest/PCB worksheets: VOA/SV-Pest/PCB VOA/SV-Pest/PCB-I Pest/PCB-IIA Pest/PCB-IIC Pest/PCB-IID Pest/PCB-IID Pest/PCB-III Pest/PCB-V-A VOA/SV-Pest/PCB-V-A BLANK ANALYSIS Pest/PCB-VII VOA/SV-Pest/PCB-V-B BLANK ANALYSIS Pest/PCB-VII VOA/SV-Pest/PCB-V-III VOA/SV-Pest/PCB-X VOA/SV-Pest/PCB-X VOA/SV-Pest/PCB-X VOA/SV-Pest/PCB-XIII Pest/PCB-XIII VOA/SV-Pest/PCB-XIII SAMPLE QUANTITATION VOA/SV-Pest/PCB-XIII SAMPLE QUANTITATION VOA/SV-Pest/PCB-XIII VOA/SV-Pest/PCB-XIII SAMPLE QUANTITATION VOA/SV-Pest/PCB-XIII VOA/SV-PEST/PCB-XIII VOA/SV-PEST/PCB-XIII VOA/SV-PEST/PCB-XIII VOA/SV-PEST/PCB-XIII VOA/SV-PEST/PCB-XIII VOA/SV-PEST/PCB-XIII VOA/SV-PEST/PCB-XIII VOA/SV-PEST/PCB-XIII VOA/SV-PEST/PCB-XIII VOA/SV-PEST/PCB-XIII VOA/SV-PEST/PCB-XI			NA.
VOA/SV-XIV VOA/SV-XV TABLE II-WORKSHEET VOA/SV-Pest/PCB VOA/SV-Pest/PCB-II Pest/PCB-IIB Pest/PCB-IIC Pest/PCB-III Pest/PCB-VI VOA/SV-Pest/PCB-V-A VOA/SV-Pest/PCB-V-B Pest/PCB-VII Pest/PCB-VII VOA/SV-Pest/PCB-V-B PESTICIDE CLEANUP VOA/SV-Pest/PCB-XI VOA/SV-Pest/PCB-XI VOA/SV-Pest/PCB-XI VOA/SV-Pest/PCB-XI VOA/SV-Pest/PCB-XII VOA/SV-Pest/PCB-XII VOA/SV-Pest/PCB-XIII	VOA/SV-Pest/PCB-XII		
Pest/PCB worksheets: VOA/SV-Pest/PCB VOA/SV-Pest/PCB VOA/SV-Pest/PCB-I Pest/PCB-IIA Pest/PCB-IIC Pest/PCB-IID Pest/PCB-III VOA/SV-Pest/PCB-V-A BLANK ANALYSIS Pest/PCB-VII VOA/SV-Pest/PCB-V-III VOA/SV-Pest/PCB-IX VOA/SV-Pest/PCB-IX VOA/SV-Pest/PCB-IX VOA/SV-Pest/PCB-XI VOA/SV-Pest/PCB-XI VOA/SV-Pest/PCB-XII Pest/PCB-XII VOA/SV-Pest/PCB-XIII SAMPLE QUANTITATION VOA/SV-Pest/PCB-XIII SAMPLE QUANTITATION VOA/SV-Pest/PCB-XIII SAMPLE QUANTITATION VOA/SV-Pest/PCB-XIIII VOA/SV-Pest/PCB-XIII VOA/SV-Pest/PCB-XIIII VOA/SV-Pest/PCB-XIIII VOA/SV-Pest/PCB-XIII VOA/SV-Pest/PCB-XIIII VOA/SV-Pest/PCB-XIIII VOA/SV-Pest/PCB-XIIII VOA/SV-Pest/PCB-XIIII VOA/SV-Pest/PCB-XIIII VOA/SV-Pest/PCB-XIIII VOA/SV-Pest/PCB-XIIII VOA/SV-Pest/PCB-XIIII VOA/SV-Pest/PCB-XIIII VOA/SV-Pest/PCB-XIIII VOA/SV-Pest/PCB-XIIII VOA/SV-Pest/PCB-XIIII VOA/SV-Pest/PCB-XIIII VOA/SV-Pest/PCB-XIIII VOA/SV-Pest/PCB-XIIII VOA/SV-Pest/PCB-XIIII VOA/SV-Pest/PCB-XIIII VOA/SV-Pest/PCB-XIIII VOA/SV-Pest/PCB-XIIII VOA/SV-PEST/PCB-XIIII VOA	VOA/SV-Pest/PCB-XIII		NA
Pest/PCB worksheets: VOA/SV-Pest/PCB VOA/SV-Pest/PCB-II Pest/PCB-IIC Pest/PCB-III VOA/SV-Pest/PCB-V-A BLANK ANALYSIS Pest/PCB-VII VOA/SV-Pest/PCB-V-III VOA/SV-Pest/PCB-IX VOA/SV-Pest/PCB-XII VOA/SV-Pest/PCB-XII Pest/PCB-XII VOA/SV-Pest/PCB-XIII SAMPLE QUANTITATION VOA/SV-Pest/PCB-XIII SAMPLE QUANTITATION VOA/SV-Pest/PCB-XIII TABLE II-WORKSHEET VOEALL EVALUATION OF DATA	VOA/SV-XIV	TENTATIVELY IDENTIFIED COMPOUNDS	
TABLE II-WORKSHEET Pest/PCB worksheets: VOA/SV-Pest/PCB VOA/SV-Pest/PCB-I Pest/PCB-IIA Pest/PCB-IIB Pest/PCB-IIB Pest/PCB-IIC Pest/PCB-IIC Pest/PCB-IID Pest/PCB-III Pest/PCB-VI VOA/SV-Pest/PCB-V-B Pest/PCB-VI Pest/PCB-VII Pest/PCB-VII Pest/PCB-VII VOA/SV-Pest/PCB-XII VOA/SV-Pest/PCB-X VOA/SV-Pest/PCB-XII Pest/PCB-XII Pest/PCB-XIII SAMPLE QUANTITATION VOA/SV-Pest/PCB-XIII SAMPLE QUANTITATION VOA/SV-Pest/PCB-XIII SAMPLE QUANTITATION VOA/SV-Pest/PCB-XIII SAMPLE QUANTITATION VOA/SV-Pest/PCB-XIII VOA/SV-Pest/PCB-XIII SAMPLE QUANTITATION VOA/SV-Pest/PCB-XIIII VOA/SV-Pest/PCB-XIIII VOA/SV-Pest/PCB-XIIII VOA/SV-Pest/PCB-XIIII VOA/SV-Pest/PCB-XIIII VOA/SV-Pest/PCB-XIIII VOA/SV-Pest/PCB-XIIII VOA/SV-Pest/PCB-XIIII VOA/SV-Pest/PCB-XIIII VOA/SV-Pest/PCB-XIIII VOA/SV-Pest/PCB-XIIII VOA/SV-Pest/PCB-XIIII VOA/SV-Pest/PCB-XIIII VOA/SV-Pest/PCB-XIIII VOA/SV-Pest/PCB-XIIII VOA/SV-Pest/PCB-XIIII VOA/SV-Pest/PCB-XIIII VOA/SV-Pest	VOA/SV-XV	SEMIVOLATILE CLEANUP	
VOA/SV-Pest/PCB VOA/SV-Pest/PCB-I Pest/PCB-IIA Pest/PCB-IIA Pest/PCB-IIB Pest/PCB-IIB GC/ECD INSTRUMENT PERFORMANCE CHECK- RESOLUTION Pest/PCB-IIC GC/ECD INSTRUMENT PERFORMANCE CHECK- RETENTION TIMES Pest/PCB-IID GC/ECD INSTRUMENT PERFORMANCE CHECK- ACCURACY CHECK OF INITIAL CALIBRATION Pest/PCB-III Pest/PCB-III Pest/PCB-III Pest/PCB-III Pest/PCB-IV VOA/SV-Pest/PCB-V-A VOA/SV-Pest/PCB-V-B Pest/PCB-VI Pest/PCB-VII Pest/PCB-VII VOA/SV-Pest/PCB-VIII VOA/SV-Pest/PCB-IX VOA/SV-Pest/PCB-IX VOA/SV-Pest/PCB-X VOA/SV-Pest/PCB-X VOA/SV-Pest/PCB-XII VOA/SV-Pest/PCB-XIII VOA/SV-PEST/PCB-XIII VOA/SV-PEST/PCB-XIII VOA/SV-PEST/PCB-XIII VOA/SV-PEST/PCB-XIII VOA/SV-PEST/PCB-XIII VOA/SV-PEST/PCB-XIII VOA/SV-PEST/PCB-XIII VOA/SV-PEST/PCB-XIII VOA/SV-PEST/PCB-XIII VOA/SV-PEST/PCB-XIII VOA/SV-PEST/PCB-XIII VOA/SV-PEST/PCB-XIII VOA/SV-PEST/PCB-XIII VOA/SV-PEST/PCB-XIII VOA/SV-PEST/PCB-XIII VOA/SV-PEST/PCB-XIII VOA/SV-PEST/PCB-XIII VO	TABLE II-WORKSHEET	OVERALL EVALUATION OF DATA	
VOA/SV-Pest/PCB VOA/SV-Pest/PCB-I Pest/PCB-IIA Pest/PCB-IIA Pest/PCB-IIB Pest/PCB-IIB GC/ECD INSTRUMENT PERFORMANCE CHECK- RESOLUTION Pest/PCB-IIC GC/ECD INSTRUMENT PERFORMANCE CHECK- RETENTION TIMES Pest/PCB-IID GC/ECD INSTRUMENT PERFORMANCE CHECK- ACCURACY CHECK OF INITIAL CALIBRATION Pest/PCB-III Pest/PCB-III Pest/PCB-III Pest/PCB-III Pest/PCB-IV VOA/SV-Pest/PCB-V-A BLANK ANALYSIS Pest/PCB-VI SURROGATE COMPOUNDS: SPIKE RECOVERIES AND RETENTION TIME SHIFT Pest/PCB-VII VOA/SV-Pest/PCB-VII VOA/SV-Pest/PCB-VIII VOA/SV-Pest/PCB-IX VOA/SV-Pest/PCB-X VOA/SV-Pest/PCB-X VOA/SV-Pest/PCB-XII VOA/SV-Pest/PCB-XII COMPOUND IDENTIFICATION SAMPLE QUANTITATION TABLE II-WORKSHEET OVERALL EVALUATION OF DATA			
VOA/SV-Pest/PCB-I Pest/PCB-IIA GC/ECD INSTRUMENT PERFORMANCE CHECK- RESOLUTION GC/ECD INSTRUMENT PERFORMANCE CHECK- RESOLUTION TIMES Pest/PCB-IIC GC/ECD INSTRUMENT PERFORMANCE CHECK- ACCURACY CHECK OF INITIAL CALIBRATION Pest/PCB-IID GC/ECD INSTRUMENT PERFORMANCE CHECK- ACCURACY CHECK OF INITIAL CALIBRATION PEST/PCB-III INITIAL CALIBRATION PEST/PCB-IV CONTINUING CALIBRATION VOA/SV-Pest/PCB-V-A BLANK ANALYSIS Pest/PCB-VI SURROGATE COMPOUNDS: SPIKE RECOVERIES AND RETENTION TIME SHIFT PEST/PCB-VII PEST/PCB-VII VOA/SV-Pest/PCB-IX VOA/SV-Pest/PCB-IX FIELD DUPLICATE PRECISION VOA/SV-Pest/PCB-X SENSITIVITY CHECK VOA/SV-Pest/PCB-XII COMPOUND IDENTIFICATION TABLE II-WORKSHEET OVERALL EVALUATION OF DATA	Pest/PCB worksheets:	•	
VOA/SV-Pest/PCB-I Pest/PCB-IIA GC/ECD INSTRUMENT PERFORMANCE CHECK- RESOLUTION GC/ECD INSTRUMENT PERFORMANCE CHECK- RESOLUTION TIMES Pest/PCB-IIC GC/ECD INSTRUMENT PERFORMANCE CHECK- ACCURACY CHECK OF INITIAL CALIBRATION Pest/PCB-IID GC/ECD INSTRUMENT PERFORMANCE CHECK- ACCURACY CHECK OF INITIAL CALIBRATION PEST/PCB-III INITIAL CALIBRATION PEST/PCB-IV CONTINUING CALIBRATION VOA/SV-Pest/PCB-V-A BLANK ANALYSIS Pest/PCB-VI SURROGATE COMPOUNDS: SPIKE RECOVERIES AND RETENTION TIME SHIFT PEST/PCB-VII PEST/PCB-VII VOA/SV-Pest/PCB-IX VOA/SV-Pest/PCB-IX FIELD DUPLICATE PRECISION VOA/SV-Pest/PCB-X SENSITIVITY CHECK VOA/SV-Pest/PCB-XII COMPOUND IDENTIFICATION TABLE II-WORKSHEET OVERALL EVALUATION OF DATA	VOA/SV-Pest/PCR	COMPLETE SDG FILE (CSF) AUDIT	NL
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Pest/PCB-IIB GC/ECD INSTRUMENT PERFORMANCE CHECK- RETENTION TIMES GC/ECD INSTRUMENT PERFORMANCE CHECK- ACCURACY CHECK OF INITIAL CALIBRATION GC/ECD INSTRUMENT PERFORMANCE CHECK- PESTICIDE DEGRADATION Pest/PCB-III Pest/PCB-III Pest/PCB-IV VOA/SV-Pest/PCB-V-A VOA/SV-Pest/PCB-V-B Pest/PCB-VI Pest/PCB-VI Pest/PCB-VII Pest/PCB-VII Pest/PCB-VII VOA/SV-Pest/PCB-VIII VOA/SV-Pest/PCB-IX VOA/SV-Pest/PCB-IX FIELD DUPLICATE PRECISION VOA/SV-Pest/PCB-XI Pest/PCB-XII Pest/PCB-XII VOA/SV-Pest/PCB-XII Pest/PCB-XIII VOA/SV-Pest/PCB-XIII VOA/SV-Pest/PCB-XIII TABLE II-WORKSHEET GC/ECD INSTRUMENT PERFORMANCE CHECK- RETENTION TIMES RETENTION TIMES RETENTION TIMES BLANK ANALYSIS DURNOGATE COMPOUNDS: SPIKE RECOVERIES AND RETENTION TIME SHIFT PEST/CIDE CLEANUP MATRIX SPIKE/MATRIX SPIKE DUPLICATE VOA/SV-Pest/PCB-XII COMPOUND IDENTIFICATION VOA/SV-Pest/PCB-XIII SAMPLE QUANTITATION OVERALL EVALUATION OF DATA	_ ICSUFCB-IIA		\
Pest/PCB-IIC GC/ECD INSTRUMENT PERFORMANCE CHECK-ACCURACY CHECK OF INITIAL CALIBRATION Pest/PCB-IID GC/ECD INSTRUMENT PERFORMANCE CHECK-PESTICIDE DEGRADATION Pest/PCB-III INITIAL CALIBRATION Pest/PCB-IV CONTINUING CALIBRATION CONTINUING CALIBRATION VOA/SV-Pest/PCB-V-B BLANK ANALYSIS Pest/PCB-VI SURROGATE COMPOUNDS: SPIKE RECOVERIES AND RETENTION TIME SHIFT Pest/PCB-VII PESTICIDE CLEANUP VOA/SV-Pest/PCB-VIII VOA/SV-Pest/PCB-XI VOA/SV-Pest/PCB-XI Pest/PCB-XII Pest/PCB-XII COMPOUND IDENTIFICATION TABLE II-WORKSHEET RETENTION TIMES GC/ECD INSTRUMENT PERFORMANCE CHECK-ACCURACY CHECK-ACCURACY CHECK ACCURACY CHECK OVERALL EVALUATION OF DATA	Dest/DCD UD		
Pest/PCB-IIC Pest/PCB-IID GC/ECD INSTRUMENT PERFORMANCE CHECK-ACCURACY CHECK OF INITIAL CALIBRATION GC/ECD INSTRUMENT PERFORMANCE CHECK-PESTICIDE DEGRADATION Pest/PCB-III Pest/PCB-IV VOA/SV-Pest/PCB-V-A VOA/SV-Pest/PCB-V-B Pest/PCB-VI Pest/PCB-VII Pest/PCB-VII VOA/SV-Pest/PCB-VIII VOA/SV-Pest/PCB-IX VOA/SV-Pest/PCB-X VOA/SV-Pest/PCB-X VOA/SV-Pest/PCB-X VOA/SV-Pest/PCB-X VOA/SV-Pest/PCB-XIII COMPOUND IDENTIFICATION VOA/SV-Pest/PCB-XIII VOA/SV-PEST/PCB-XIII VOA/SV-PEST/PCB-XIII VOA/SV-PEST/PCB-XIII VOA/SV-PEST/PCB-XIII VOA/SV-PEST/PCB-XIII VOA/SV-PEST/PCB-XIII VOA/SV-PEST/PCB-XIII VOA/SV-PEST/PCB-XIII VOA/SV-PEST/PCB-XIII VOA/SV-PEST/PCB-XIII VOA/SV-PEST/PCB-XIII VOA/SV-PEST/PCB-XIII VOA/SV-PEST/PCB-XIII VOA/SV-PEST/PCB-XIII VOA/SV-PEST/PCB-XIII VOA	resurco-no		}
ACCURACY CHECK OF INITIAL CALIBRATION GC/ECD INSTRUMENT PERFORMANCE CHECK- PESTICIDE DEGRADATION INITIAL CALIBRATION CONTINUING CALIBRATION VOA/SV-Pest/PCB-V-A VOA/SV-Pest/PCB-V-B Pest/PCB-VI SPIKE RECOVERIES AND RETENTION TIME SHIFT PEST/CB-VII PESTICIDE CLEANUP VOA/SV-Pest/PCB-VIII VOA/SV-Pest/PCB-X VOA/SV-Pest/PCB-X VOA/SV-Pest/PCB-X VOA/SV-Pest/PCB-XI Pest/PCB-XII COMPOUND IDENTIFICATION VOA/SV-Pest/PCB-XIII SAMPLE QUANTITATION TABLE II-WORKSHEET ACCURACY CHECK VOA/SV-PEST/PCB-XIII OVERALL EVALUATION OF DATA	Past/DCD HC		
Pest/PCB-IID GC/ECD INSTRUMENT PERFORMANCE CHECK-PESTICIDE DEGRADATION Pest/PCB-III Pest/PCB-IV CONTINUING CALIBRATION CONTINUING CALIBRATION VOA/SV-Pest/PCB-V-A BLANK ANALYSIS Pest/PCB-VI SURROGATE COMPOUNDS: SPIKE RECOVERIES AND RETENTION TIME SHIFT PESTICIDE CLEANUP VOA/SV-Pest/PCB-VII WATRIX SPIKE/MATRIX SPIKE DUPLICATE VOA/SV-Pest/PCB-IX VOA/SV-Pest/PCB-X VOA/SV-Pest/PCB-X VOA/SV-Pest/PCB-XI Pest/PCB-XII COMPOUND IDENTIFICATION TABLE II-WORKSHEET OVERALL EVALUATION OF DATA	resurch-ne		1
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Pest/PCB-IV VOA/SV-Pest/PCB-V-A VOA/SV-Pest/PCB-V-B Pest/PCB-VI Pest/PCB-VI Pest/PCB-VII VOA/SV-Pest/PCB-VIII VOA/SV-Pest/PCB-VIII VOA/SV-Pest/PCB-IX VOA/SV-Pest/PCB-IX VOA/SV-Pest/PCB-X VOA/SV-Pest/PCB-XI VOA/SV-Pest/PCB-XI VOA/SV-Pest/PCB-XI Pest/PCB-XII Pest/PCB-XII COMPOUND IDENTIFICATION TABLE II-WORKSHEET CONTINUING CALIBRATION BLANK ANALYSIS SURROGATE COMPOUNDS: SPIKE RECOVERIES AND RETENTION TIME SHIFT PESTICIDE CLEANUP MATRIX SPIKE/MATRIX SPIKE DUPLICATE FIELD DUPLICATE PRECISION ACCURACY CHECK COMPOUND IDENTIFICATION SAMPLE QUANTITATION TABLE II-WORKSHEET OVERALL EVALUATION OF DATA	Dost/DCD III		
VOA/SV-Pest/PCB-V-A VOA/SV-Pest/PCB-V-B BLANK ANALYSIS Pest/PCB-VI SURROGATE COMPOUNDS: SPIKE RECOVERIES AND RETENTION TIME SHIFT PEST/PCB-VII PESTICIDE CLEANUP WOA/SV-Pest/PCB-VIII WATRIX SPIKE/MATRIX SPIKE DUPLICATE FIELD DUPLICATE PRECISION VOA/SV-Pest/PCB-X VOA/SV-Pest/PCB-XI Pest/PCB-XII COMPOUND IDENTIFICATION TABLE II-WORKSHEET BLANK ANALYSIS BLANK ANALYSIS ACUROCATE PROBLE ACTURATION COMPOUND TIME SHIFT PEST/CB-VIII COMPOUND IDENTIFICATION SAMPLE QUANTITATION OVERALL EVALUATION OF DATA			
VOA/SV-Pest/PCB-V-B Pest/PCB-VI SURROGATE COMPOUNDS: SPIKE RECOVERIES AND RETENTION TIME SHIFT Pest/PCB-VII PESTICIDE CLEANUP VOA/SV-Pest/PCB-VIII MATRIX SPIKE/MATRIX SPIKE DUPLICATE VOA/SV-Pest/PCB-IX FIELD DUPLICATE PRECISION VOA/SV-Pest/PCB-XI SENSITIVITY CHECK VOA/SV-Pest/PCB-XI Pest/PCB-XII COMPOUND IDENTIFICATION TABLE II-WORKSHEET OVERALL EVALUATION OF DATA			-+-
Pest/PCB-VI SURROGATE COMPOUNDS: SPIKE RECOVERIES AND RETENTION TIME SHIFT Pest/PCB-VII PESTICIDE CLEANUP VOA/SV-Pest/PCB-VIII MATRIX SPIKE DUPLICATE VOA/SV-Pest/PCB-IX FIELD DUPLICATE PRECISION VOA/SV-Pest/PCB-XI SENSITIVITY CHECK VOA/SV-Pest/PCB-XII COMPOUND IDENTIFICATION VOA/SV-Pest/PCB-XIII SAMPLE QUANTITATION TABLE II-WORKSHEET OVERALL EVALUATION OF DATA			
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Signature: Carel a Euk Sor	Name: Carol A. Erikson
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VOA/SV -	Pest.	/PCB-V-A	

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7 4		71 T T T T	//////	4 1 1 1 1 1 1

List the blank contamination below.			Concentration	1 Level: Low
Sampler:	Company: Row	Contacted:	Yes No	Date:
1. Laboratory: Method. Storage	and Instrument Rlanks			

Date Extracted	Date Analyzed	Parameter/ Matrix	Sample No. (Blank Type)	Instrument/ Column	Compound	Conc. (units)
5/30/01	6/4/01	SVOC/AD	SBLKSQ/MB	HP5971Q	BREHP	2 mg/L
, ·						70'
						

2. Field: Equipment (Rinsate), Trip and Bottle Blanks

Date Extracted	Date Analyzed	Parameter/ <u>Ma</u> trix	Sample No. (Blank Type)	Instrument/ Column	Compound	Conc. (units)
Non	Juded					
```````````````````````````````````````	100					

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	442		,	1	
7 - 11 I. A	11/16		, T-1	1 -	
Validator:	Cae	Date:	$-Q(I_{\bullet})$	$\sim 1$	
midulot.		Date:	81 CO 1	<i>₹3</i> 1	
•					
			-7	· · · · - · · - · · - · · ·	

3. Blank Actions - List the maximum concentrations of blank compounds.

Compound	Type of Blank	Date Blank Sampled/Originated	Max. Conc. (units)	Action Level (units)	Sample QL	Samples Affected	Action
BAEHP	Method	5/20/01	2/19/1	DouglL	10,49/1	5W-04, -09	u @
			<u> </u>			<del></del>	
			<u> </u>				
		,					
•							

Comments:		
Validator:_	COE	Date: 8/6/01

EPA-NE - Data Validation Worksheet VOA/SV - Pest/PCB-X

X. :	SENSITIVITY	CHECK	(Method	Detection	Limit	Study)
------	-------------	-------	---------	-----------	-------	--------

Has an Date of		L study bee	n submitted with Within 1 ve	ds that are outside t seven replicates fo ar?		ria. und and matrix of inter	est? Y N Y N Y N Y N Y N
Matrix	Compound	MDL 5 QL	Method QC Limits < 80% or > 120%	IS Outside Area Count and/or RT Criteria	RSD > 20%	Samples Affected	Action
				-			
	•	-	•	results to evaluate surrogates and inter		that are outside criteria	•
Has an Does it Was the	appropriate and contain all targe LFB spiked wi	complete Li et compound th a standar	FB been submitted is at the method-it of the from a source of the from a source of the from a source of the from a source of the from a source of the from a source of the from a source of the from a source of the from a source of the from a source of the from a source of the from a source of the from a source of the from a source of the from a source of the from a source of the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the from the	ed at the proper free required QLs? (vendor) independer	nuency? (a) 40 ug/L nt of the calib	or 120mg/L (benjoration standard? can't f	aud Y N

Matrix SBLKSQ	Compound	Method QC Limits < 60% or > 140% Other:	IS Outside Area Count and/or RT Criteria	Samples Affected	Action /	
540C	Benjie said	970 (QC 0-25	70)	5W-04, -09	J (low Dialo	th spls,
	245 TCP	6270 (QC 71-12	4%)	SW-04 -09	UJ	İ

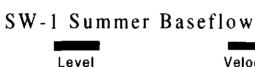
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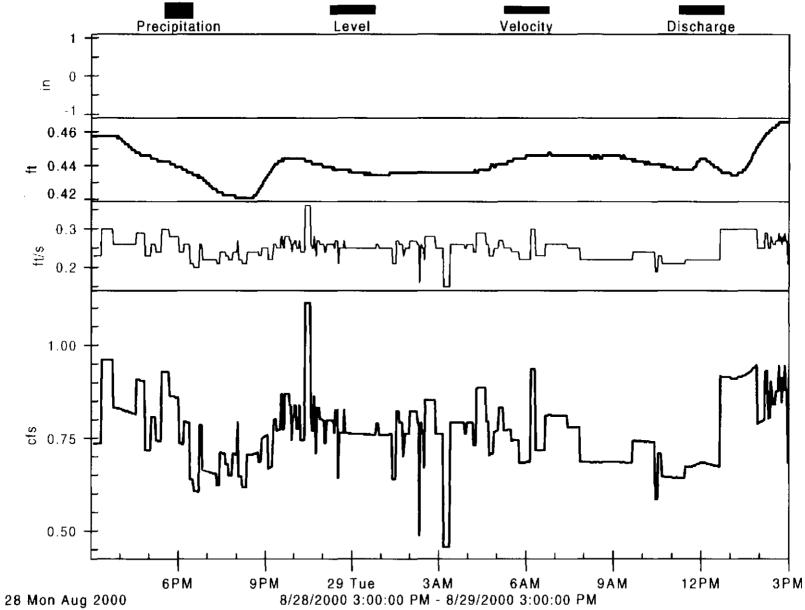
## APPENDIX H

Hydrographs

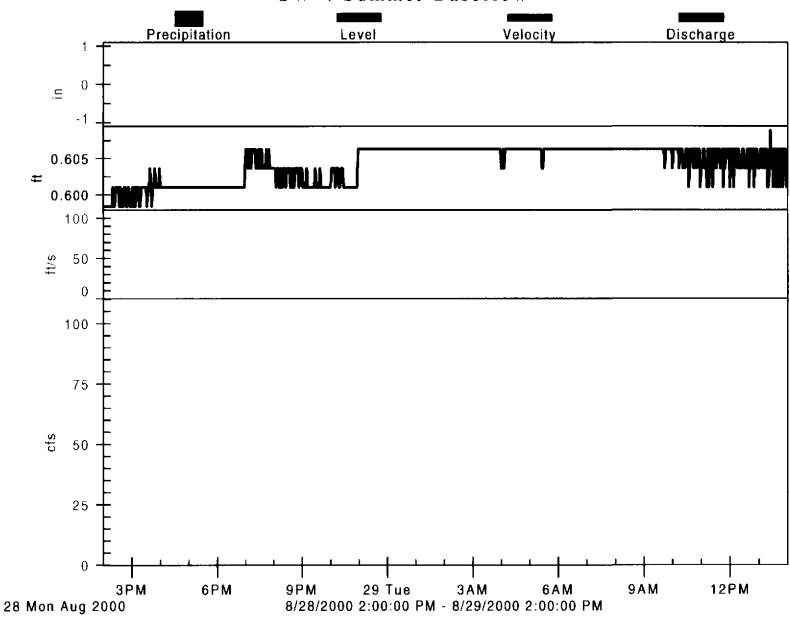
ROUX ASSOCIATES, INC.

Summer Baseflow

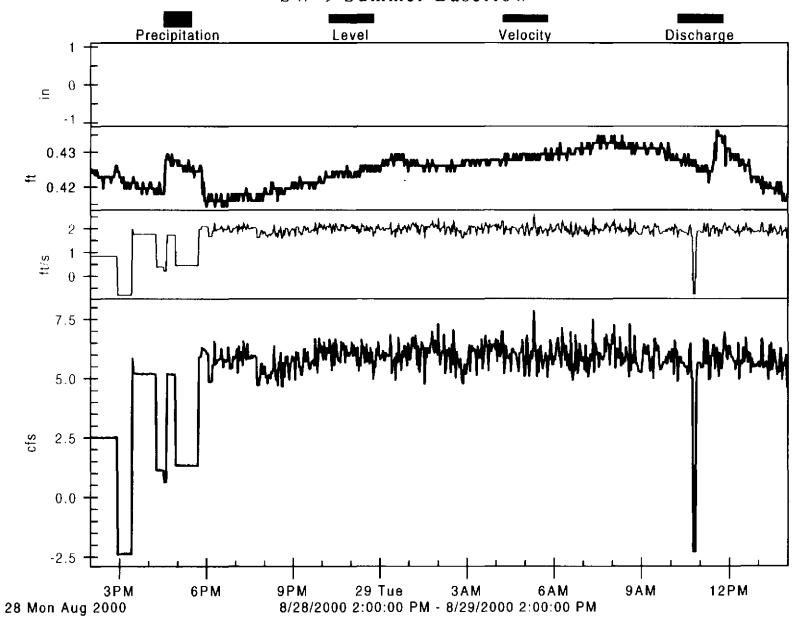




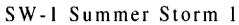
SW-4 Summer Baseflow

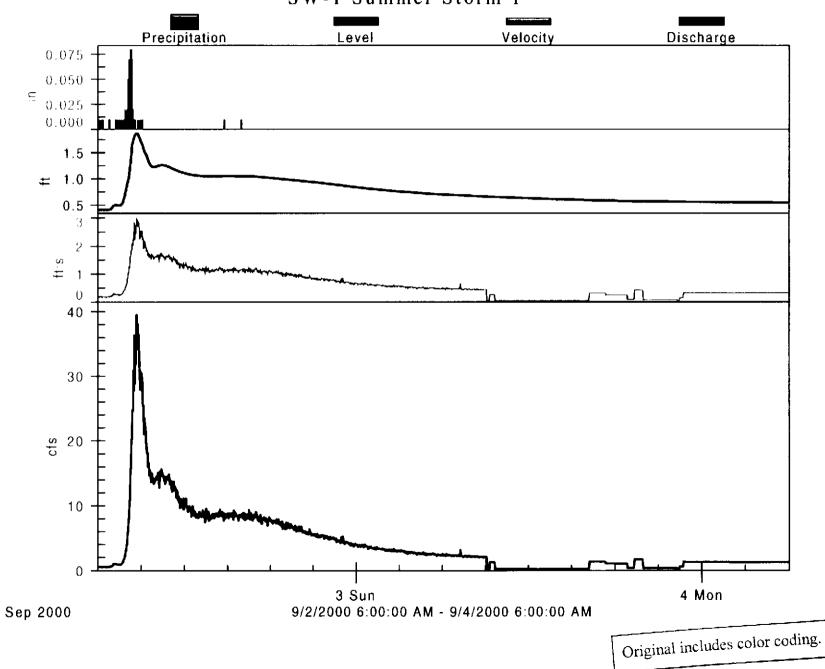


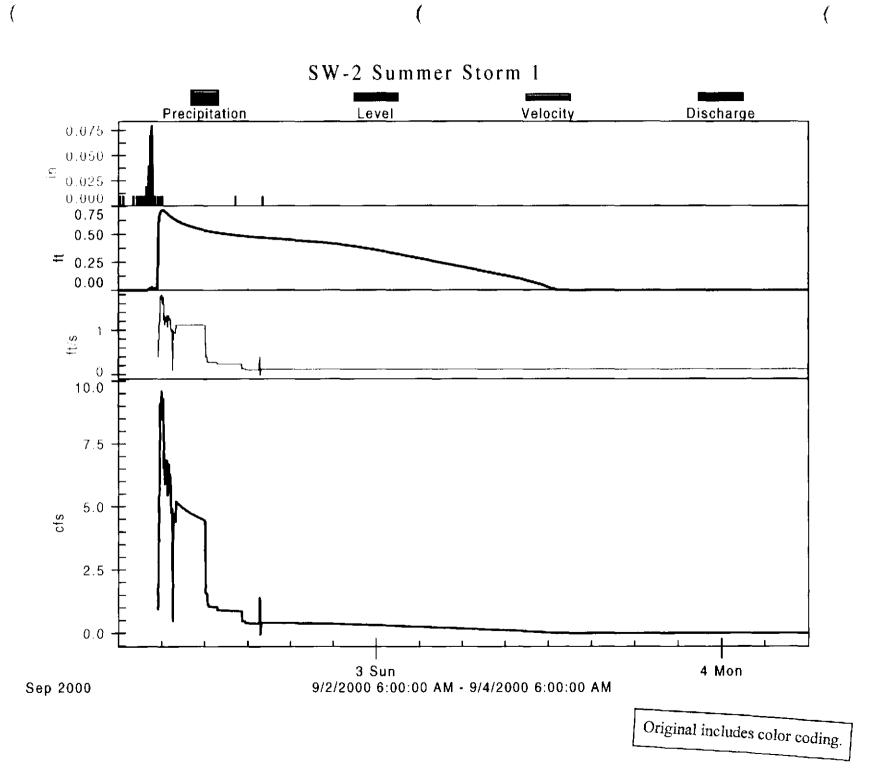
SW-9 Summer Baseflow

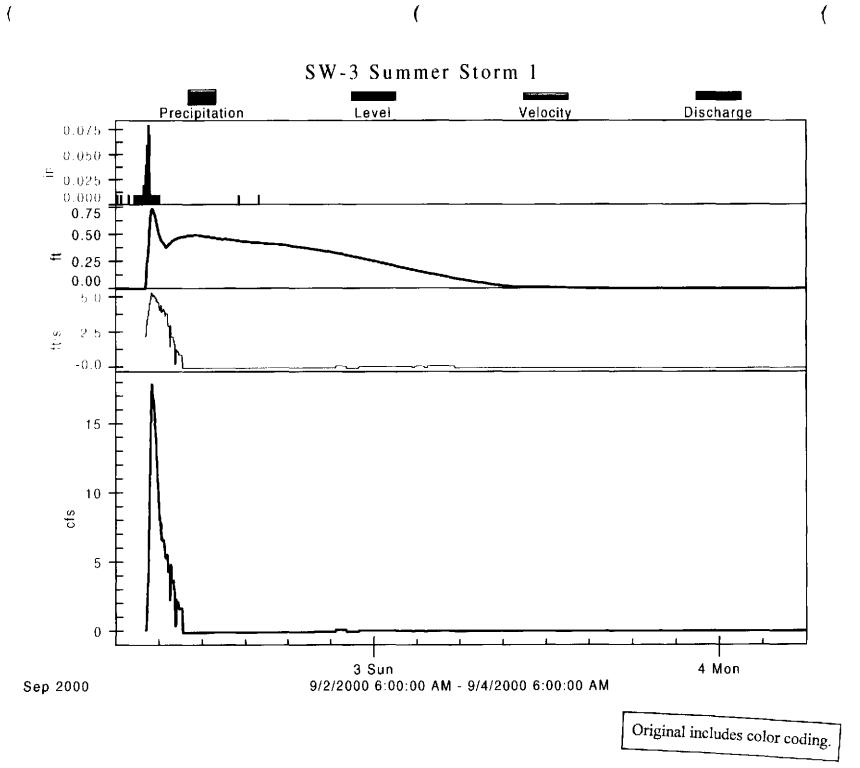


Summer Storm 1

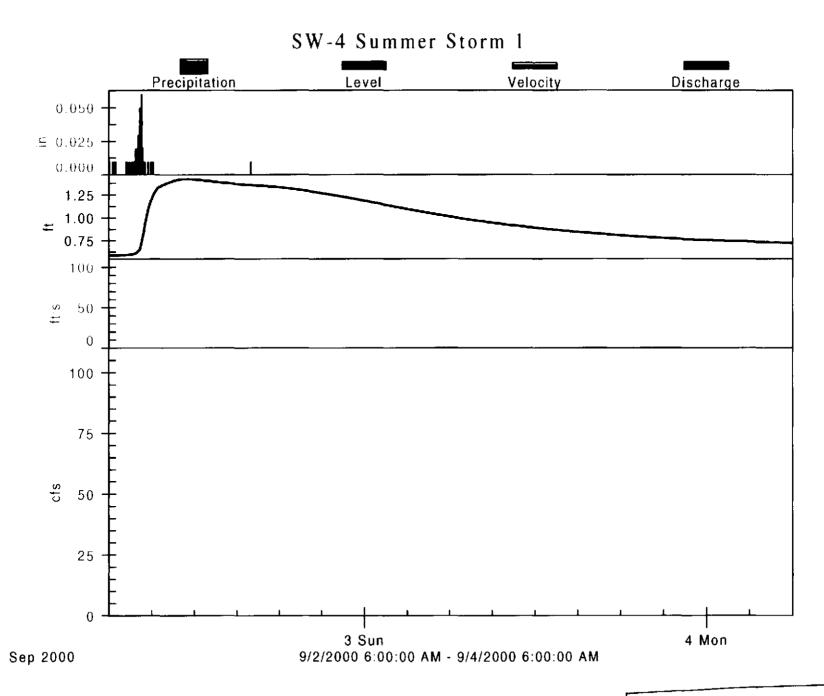




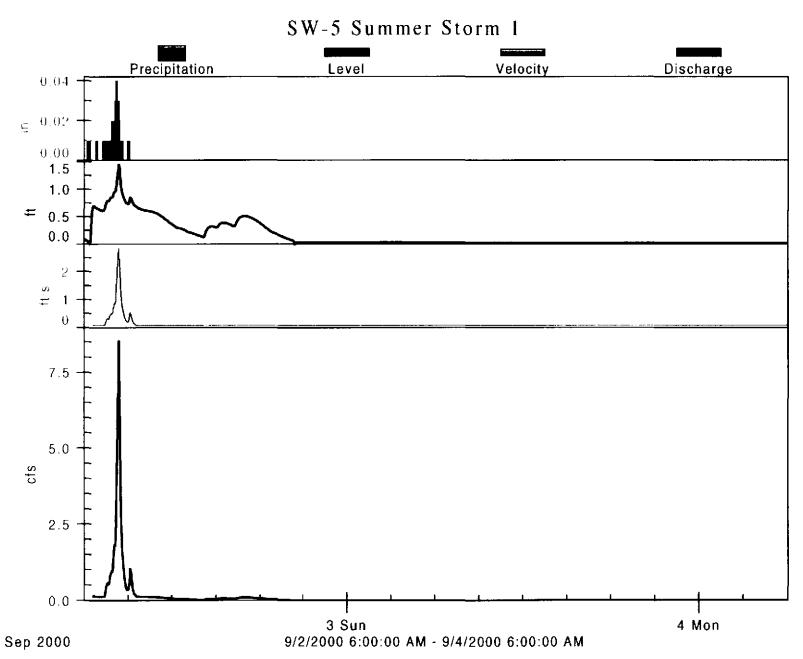


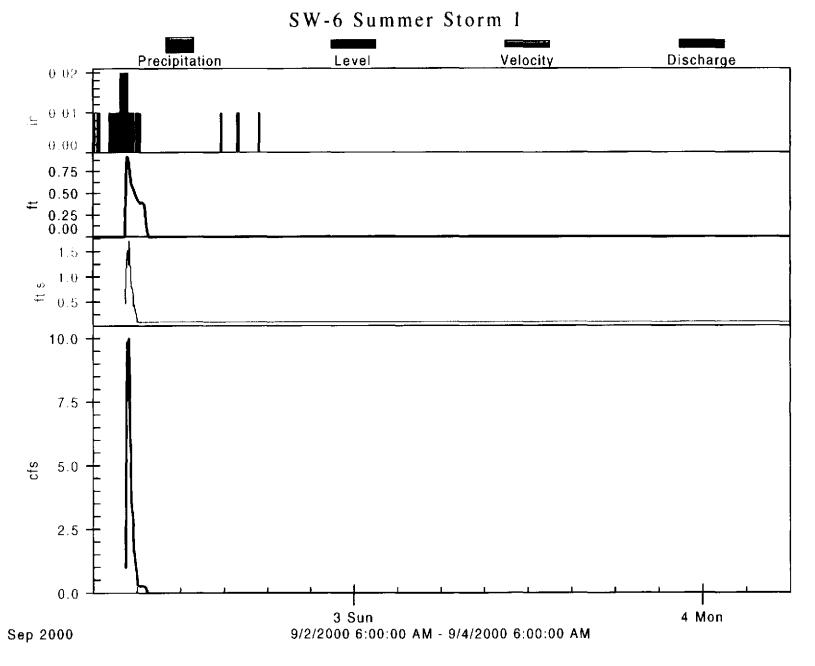


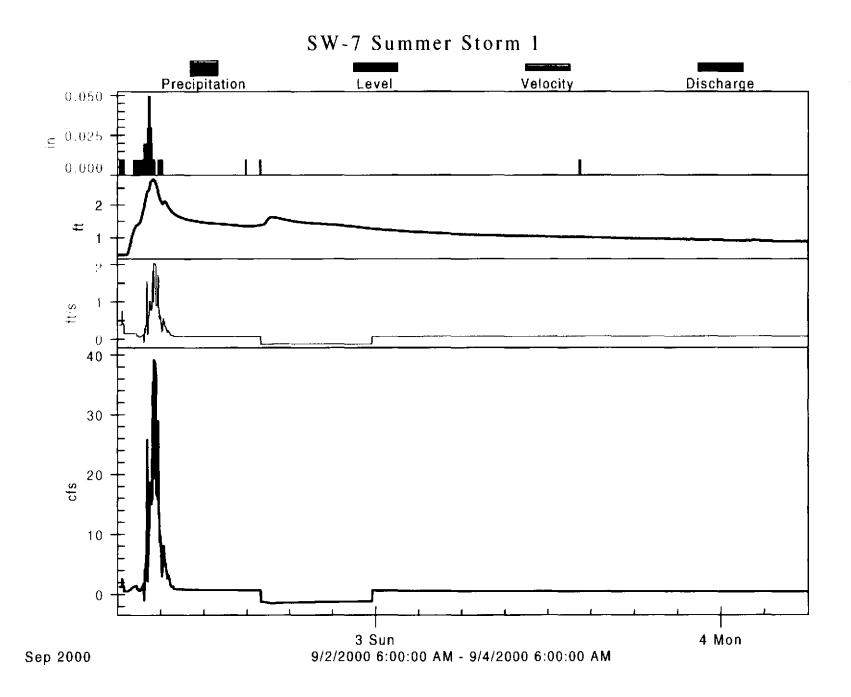


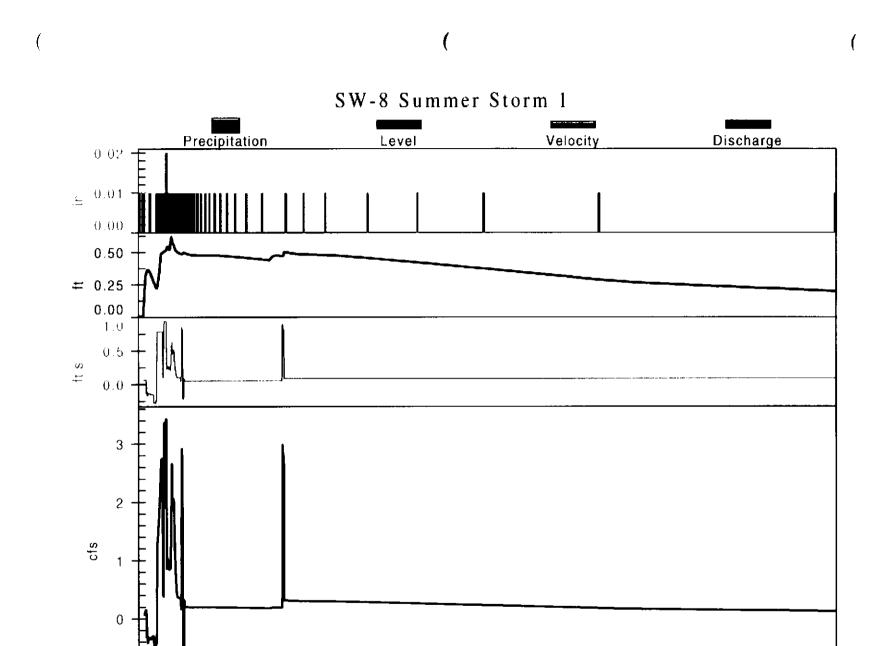








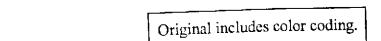




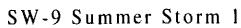
3 Sun

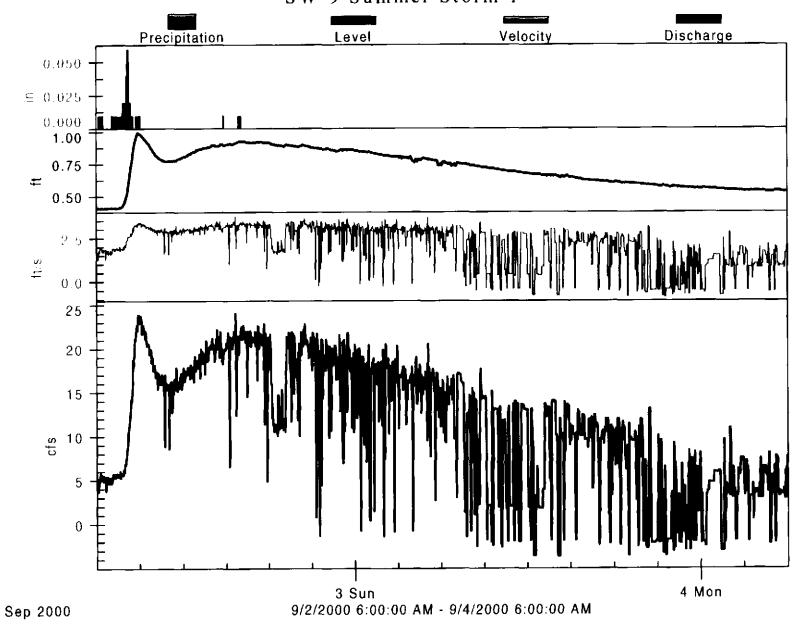
9/2/2000 6:00:00 AM - 9/4/2000 6:00:00 AM

Sep 2000



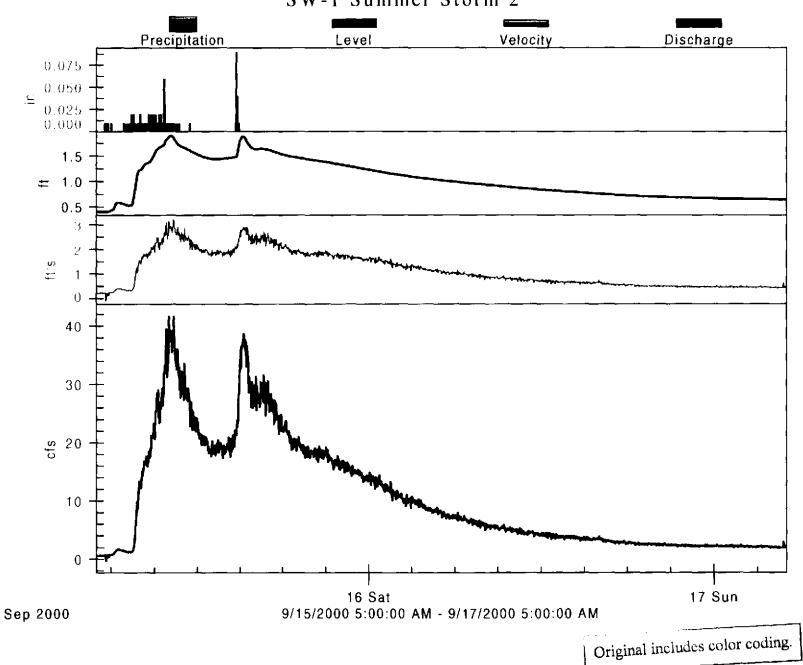
4 Mon

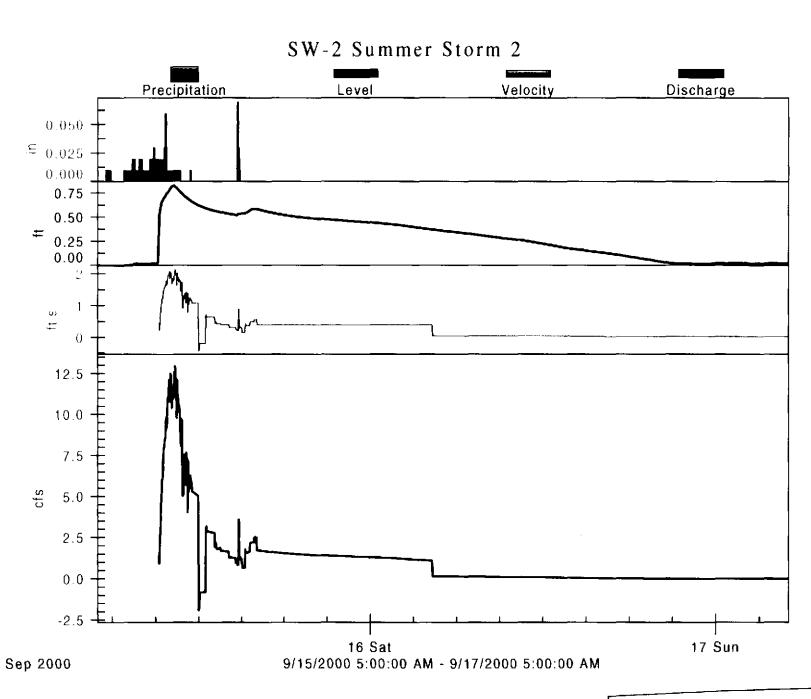


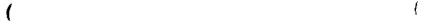


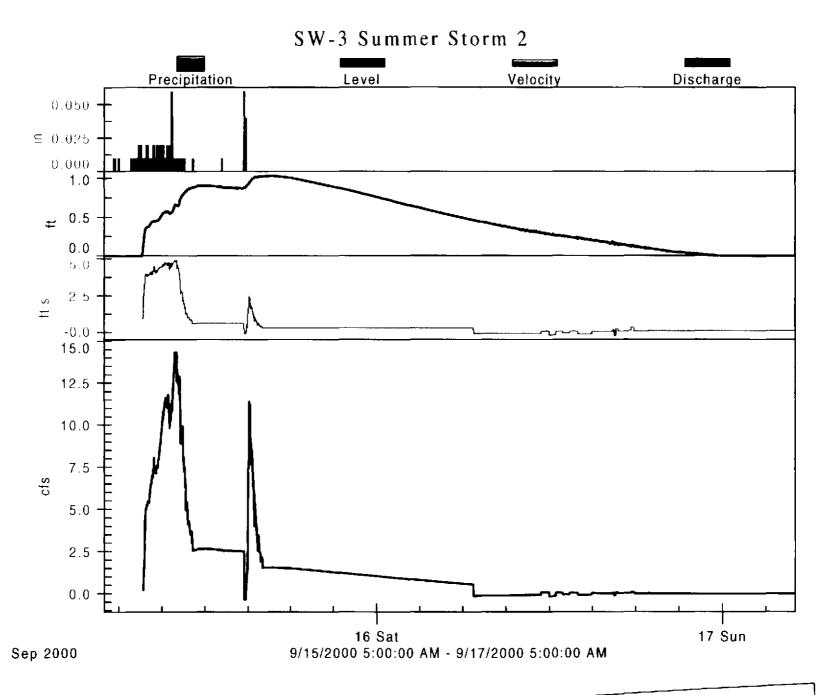
Summer Storm 2

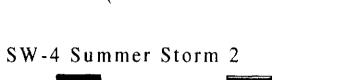
SW-1 Summer Storm 2

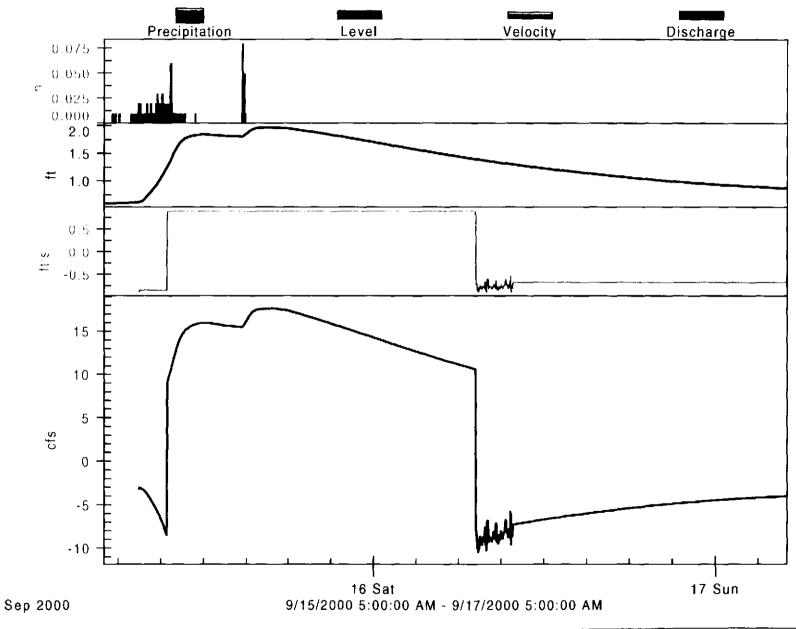




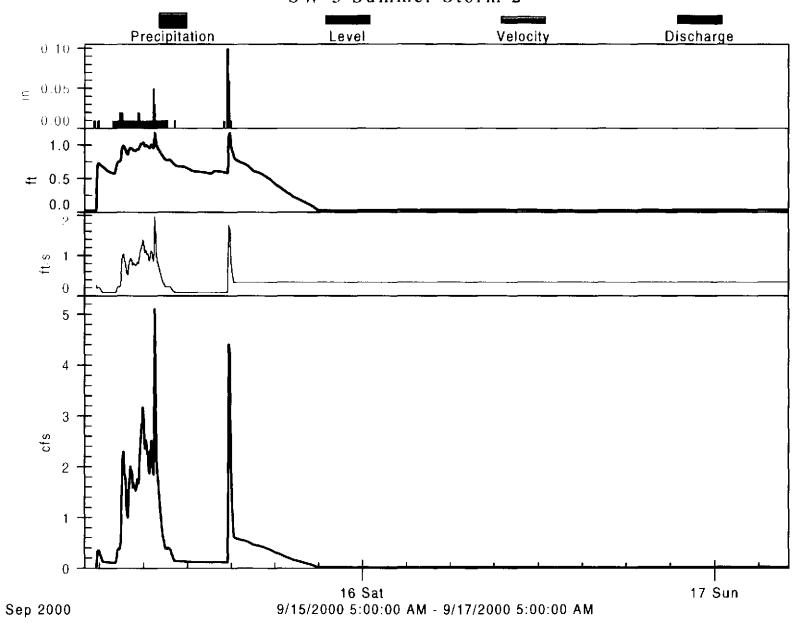




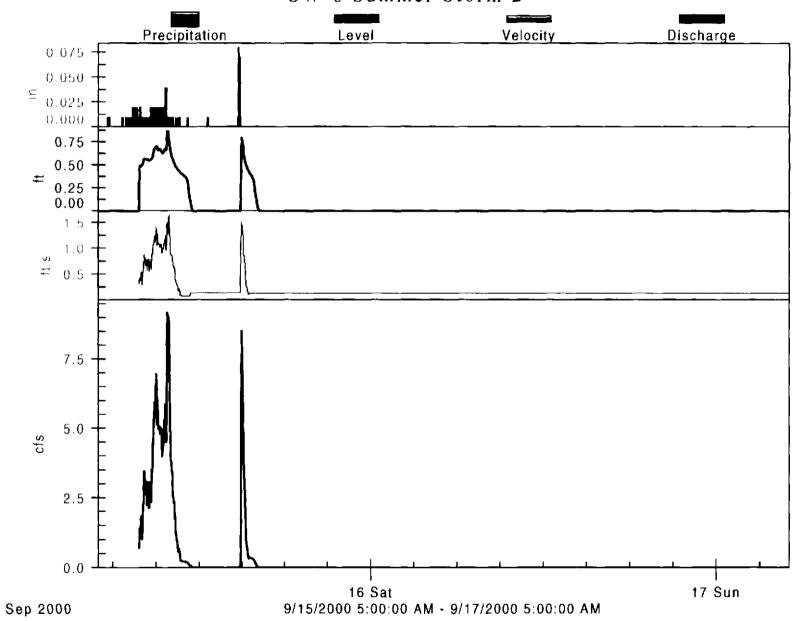


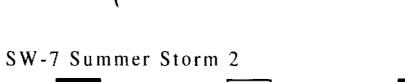


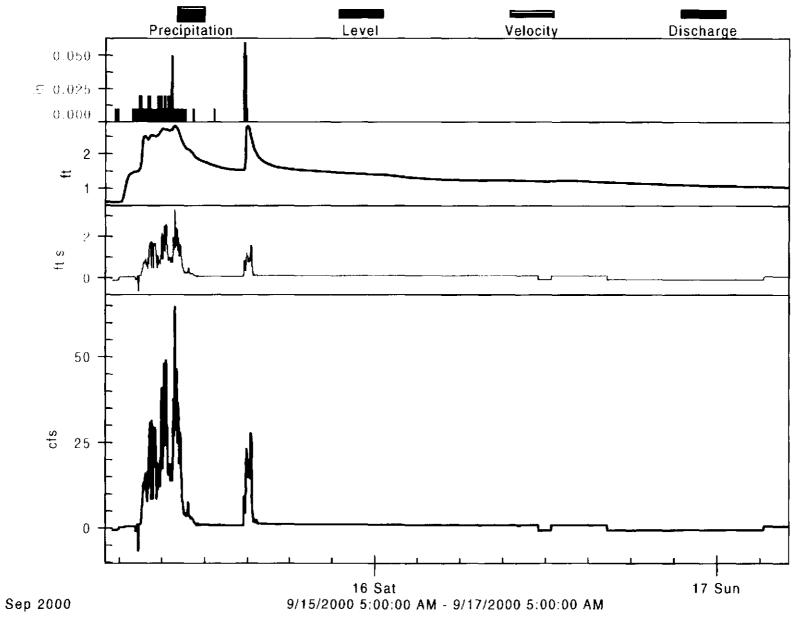
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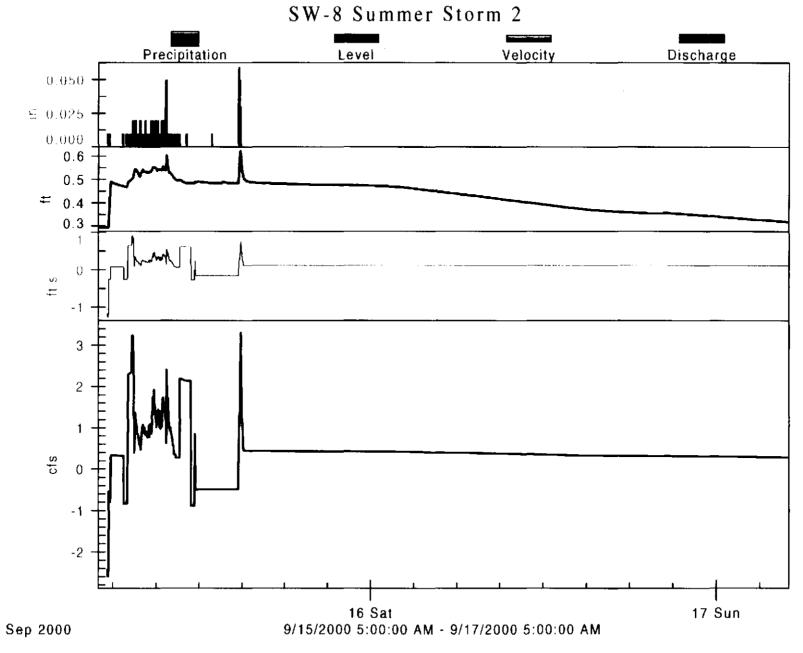
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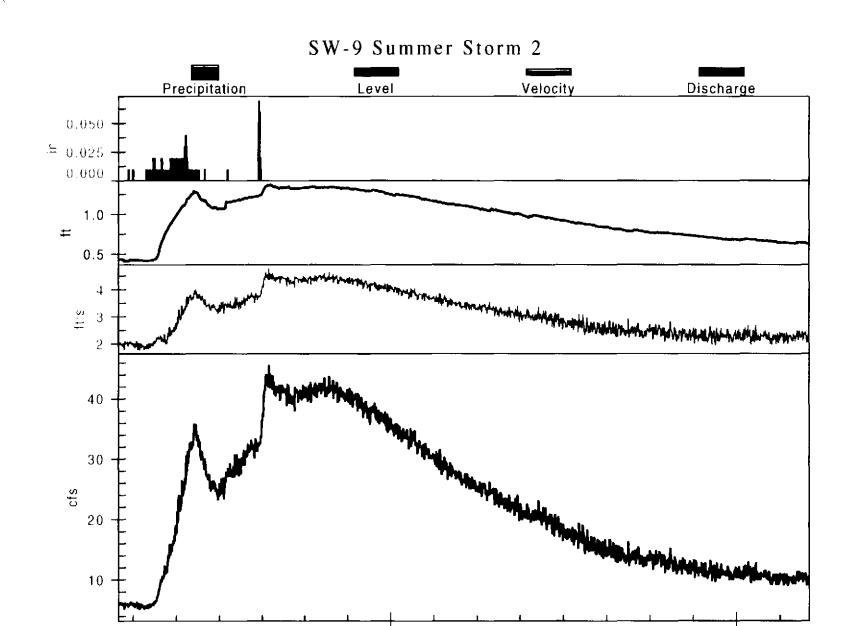












16 Sat

Sep 2000

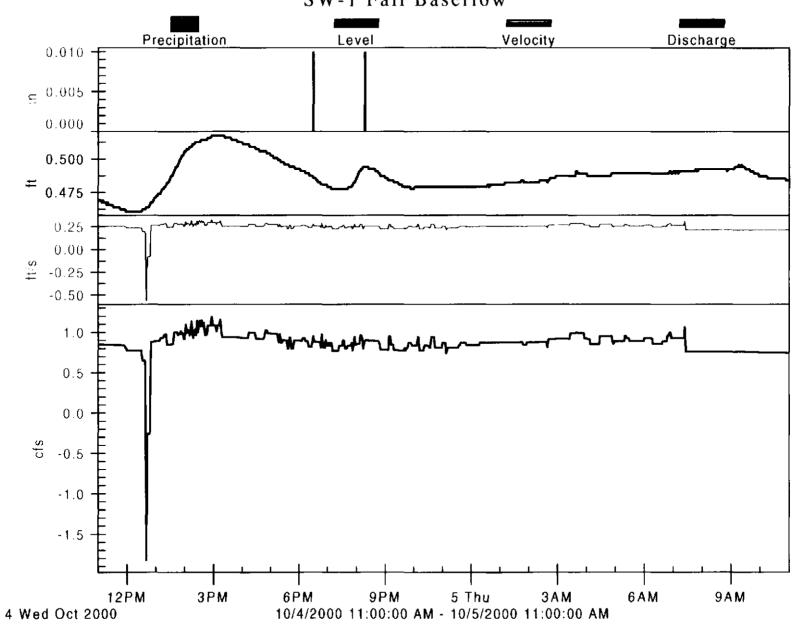
9/15/2000 5:00:00 AM - 9/17/2000 5:00:00 AM

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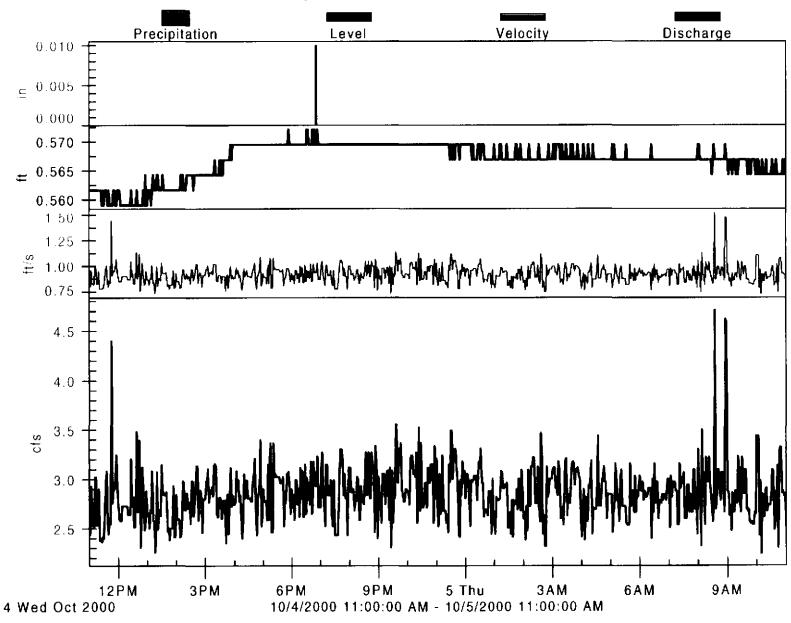
17 Sun

Fall Baseflow

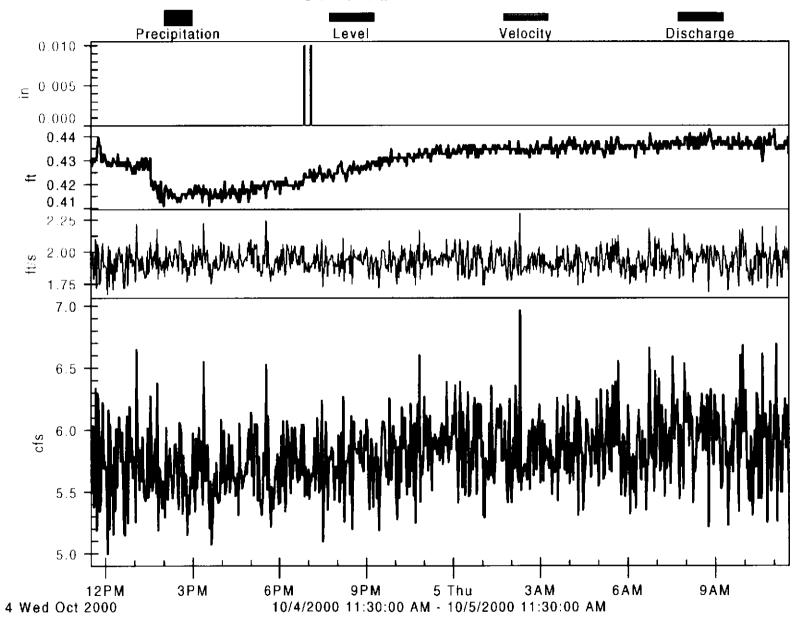




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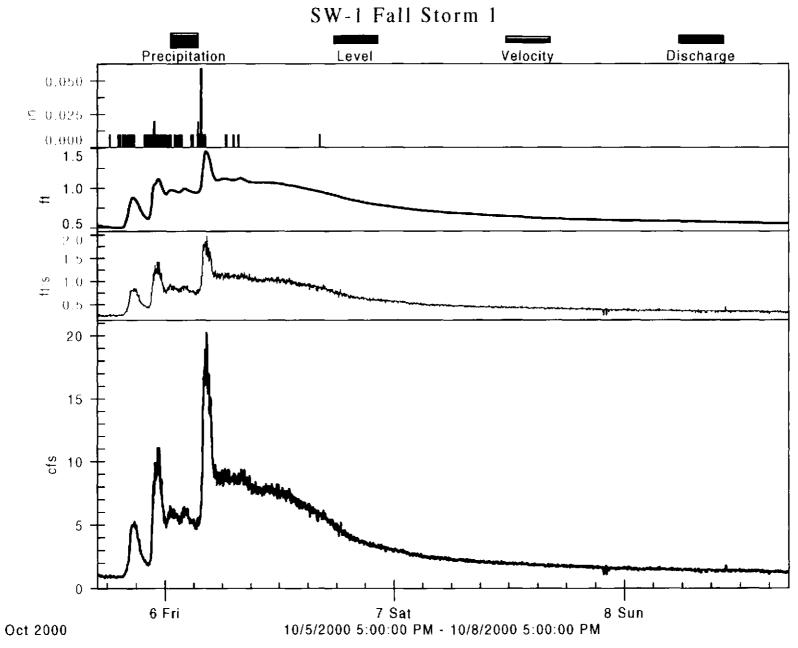


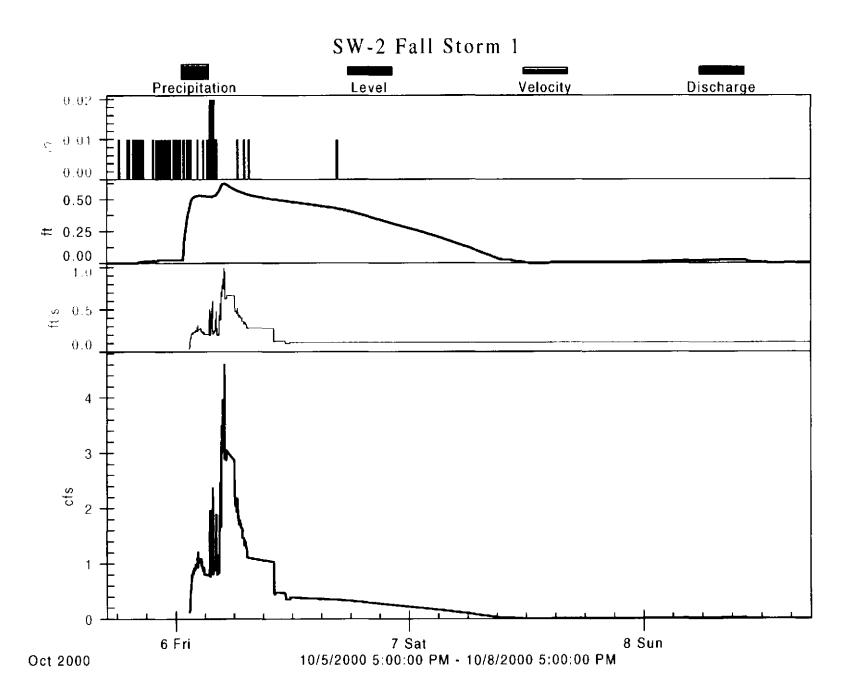
SW-9 Fall Baseflow

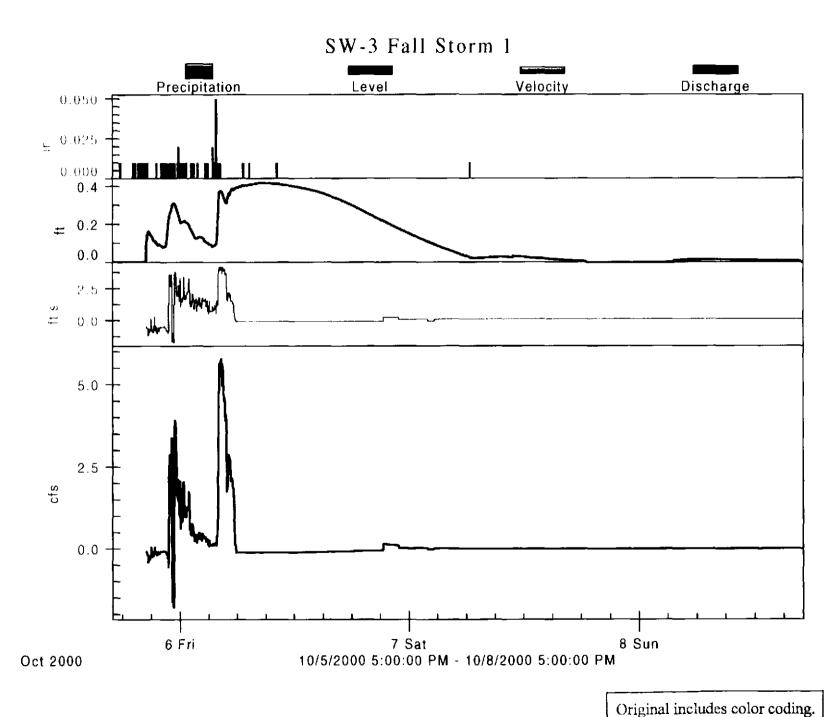


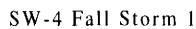
Fall Storm 1

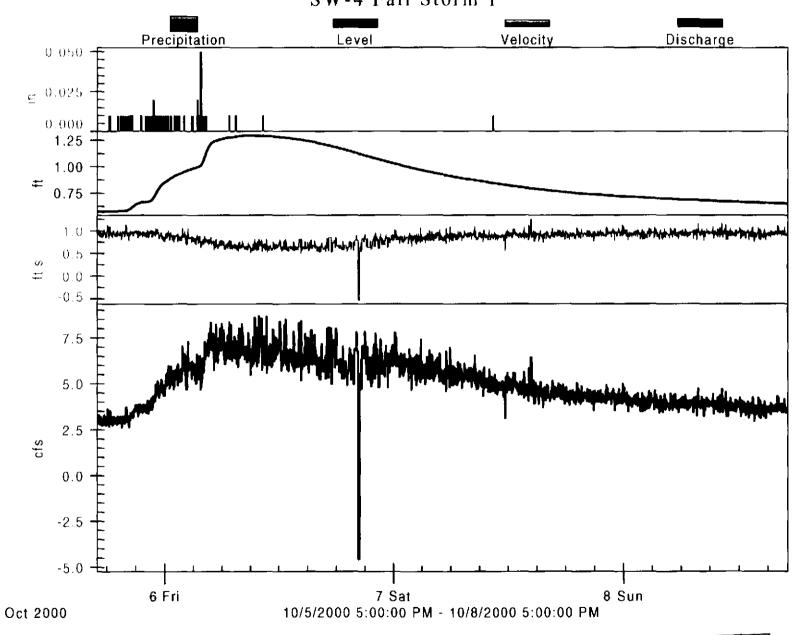


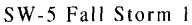


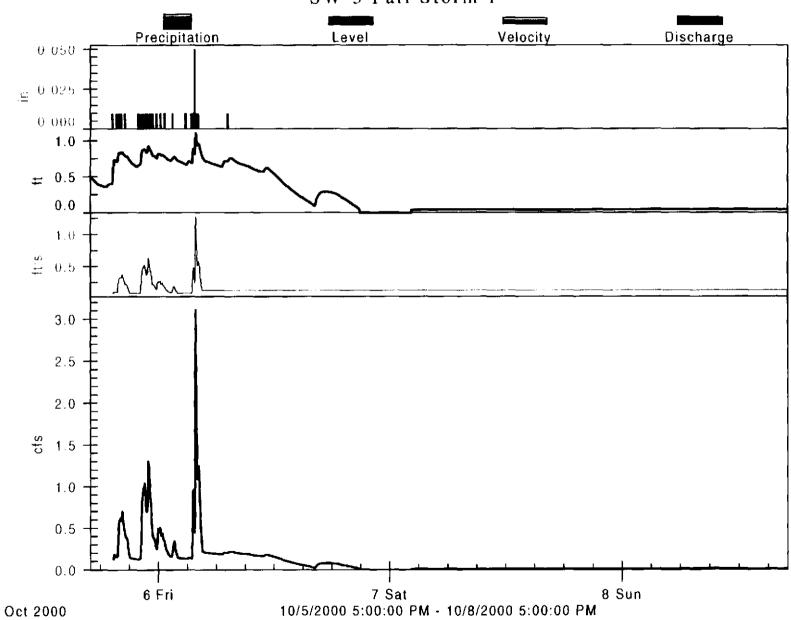


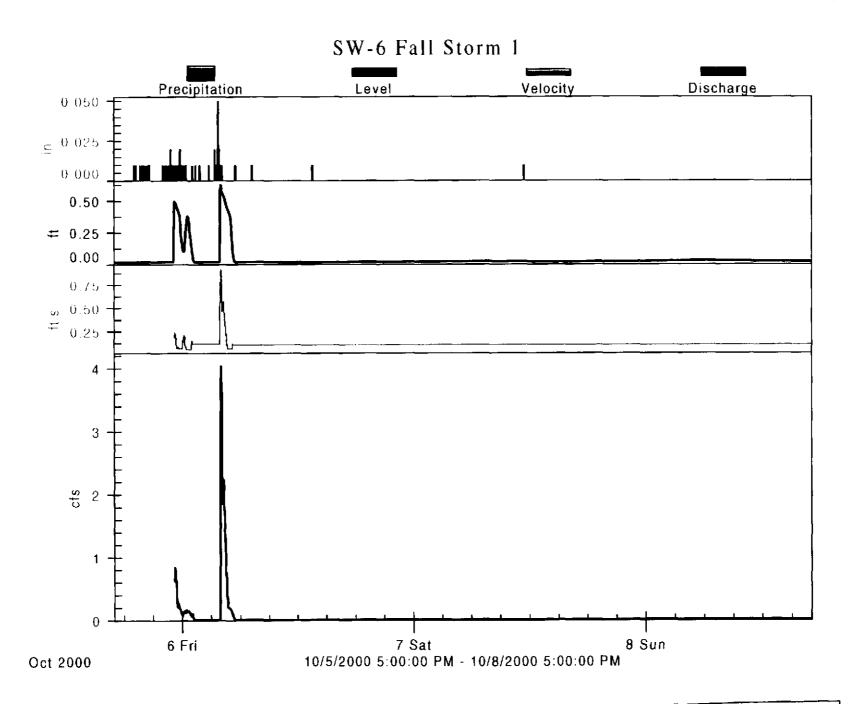


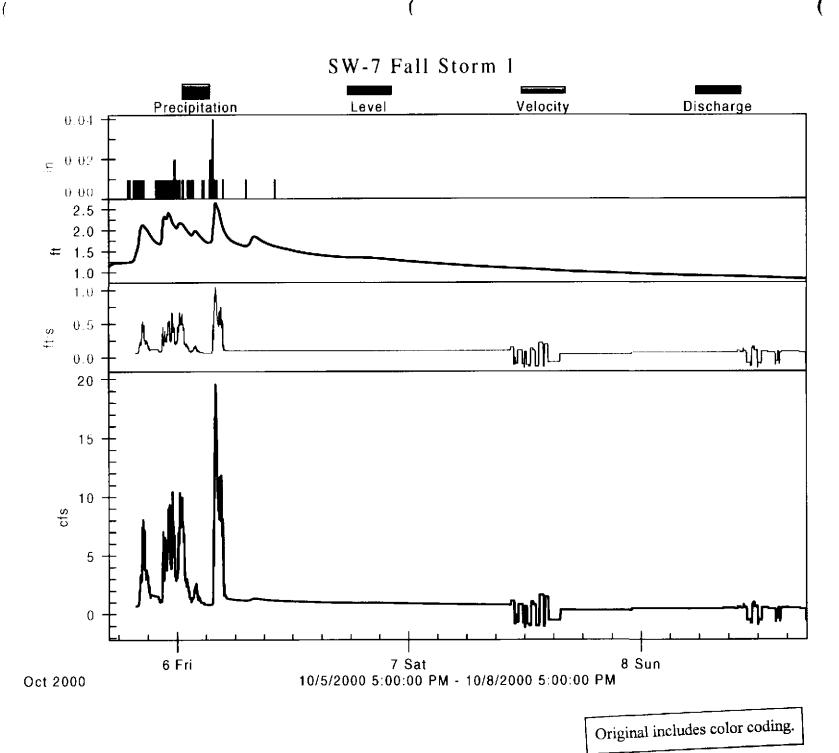


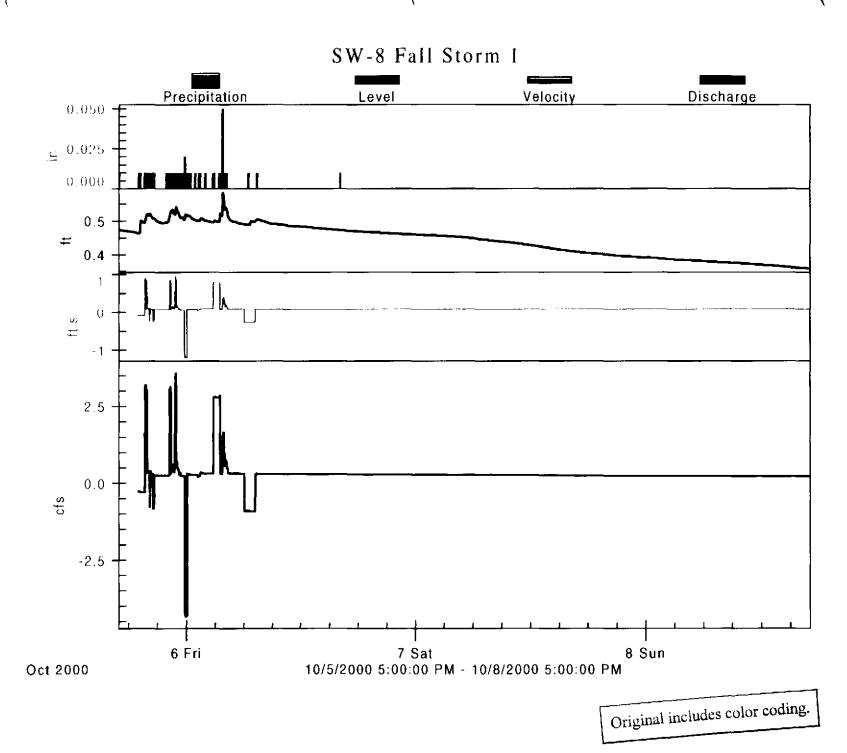


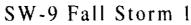


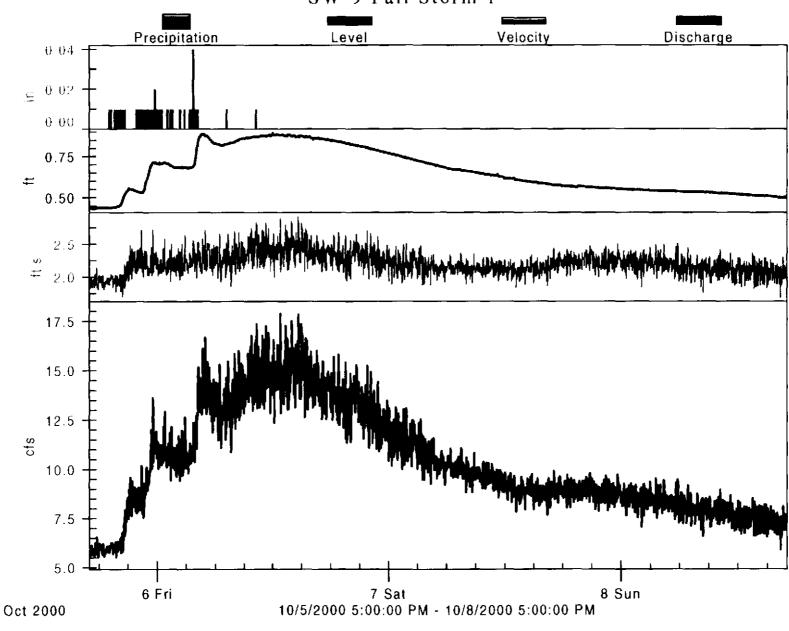




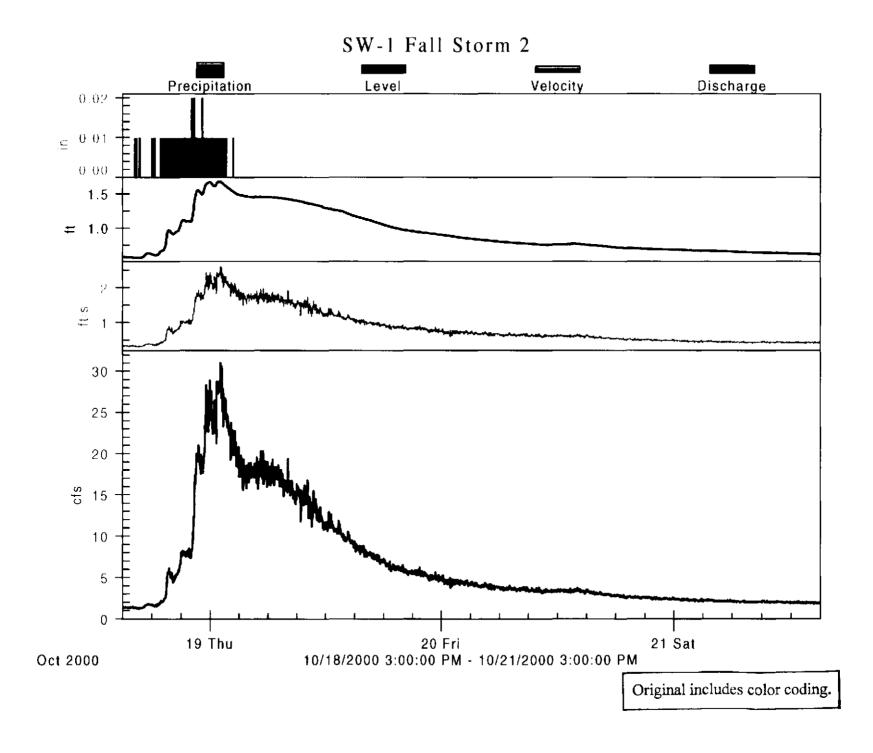


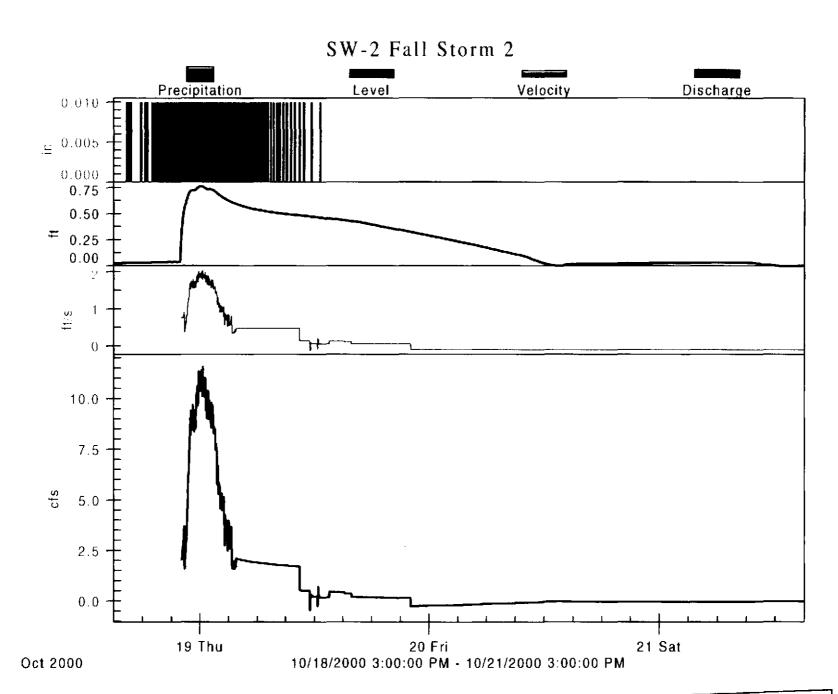


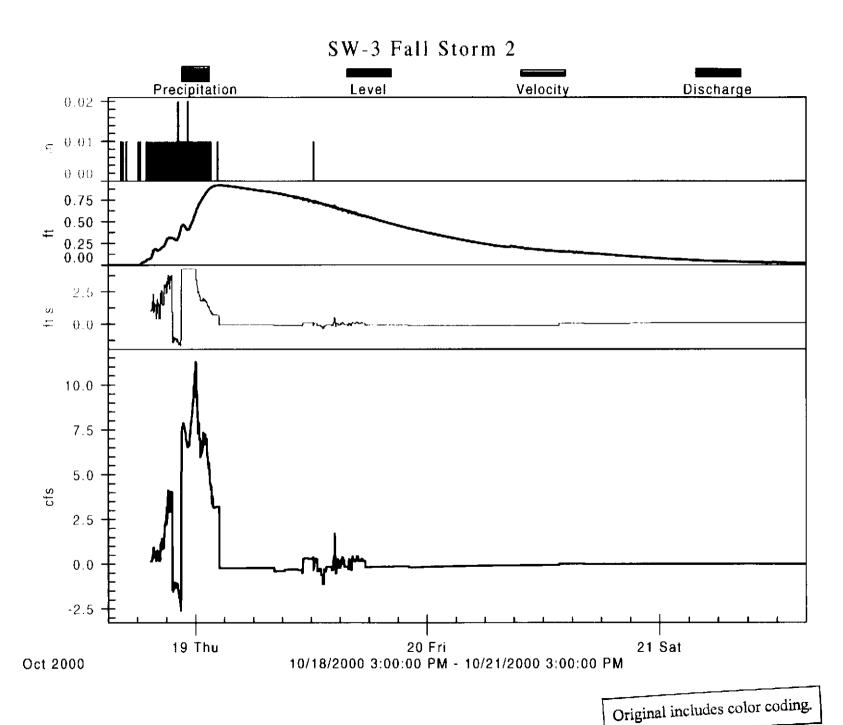


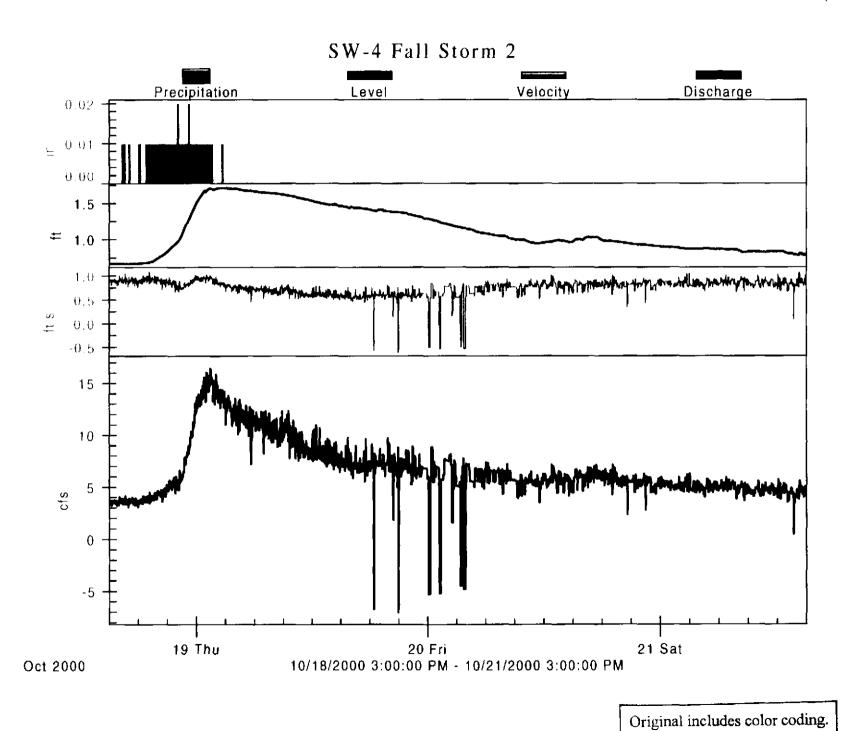


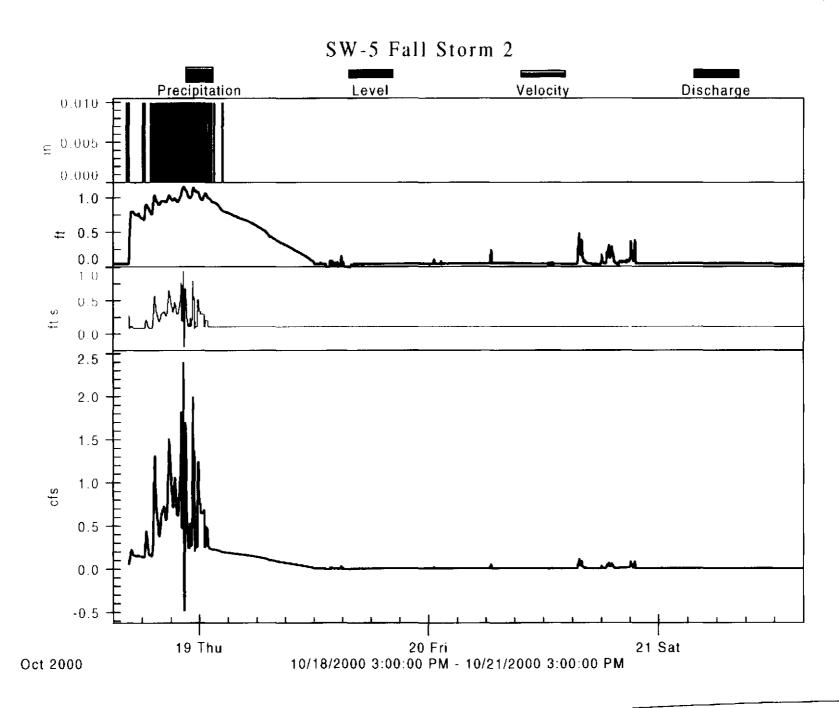
Fall Storm 2

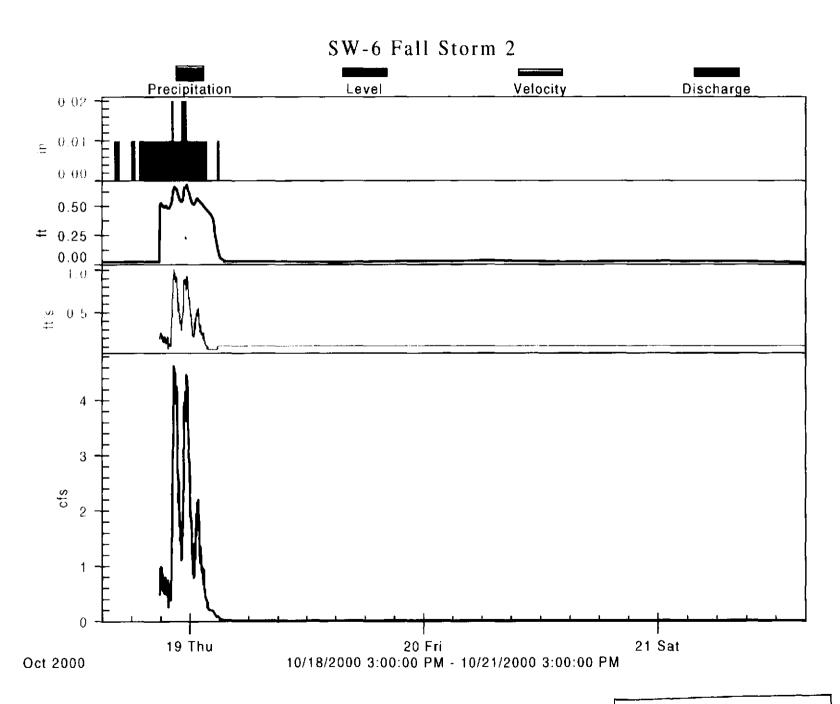


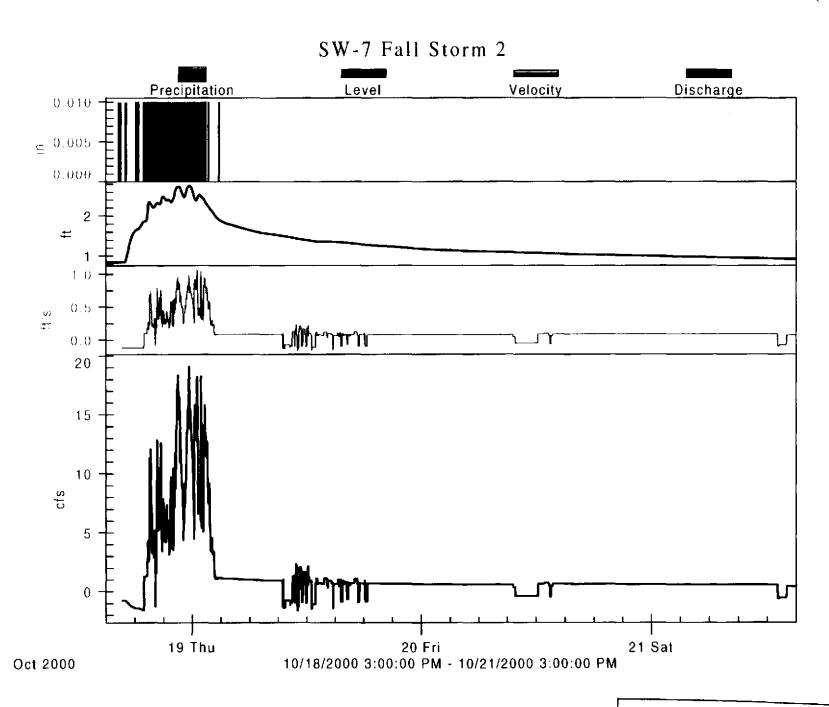


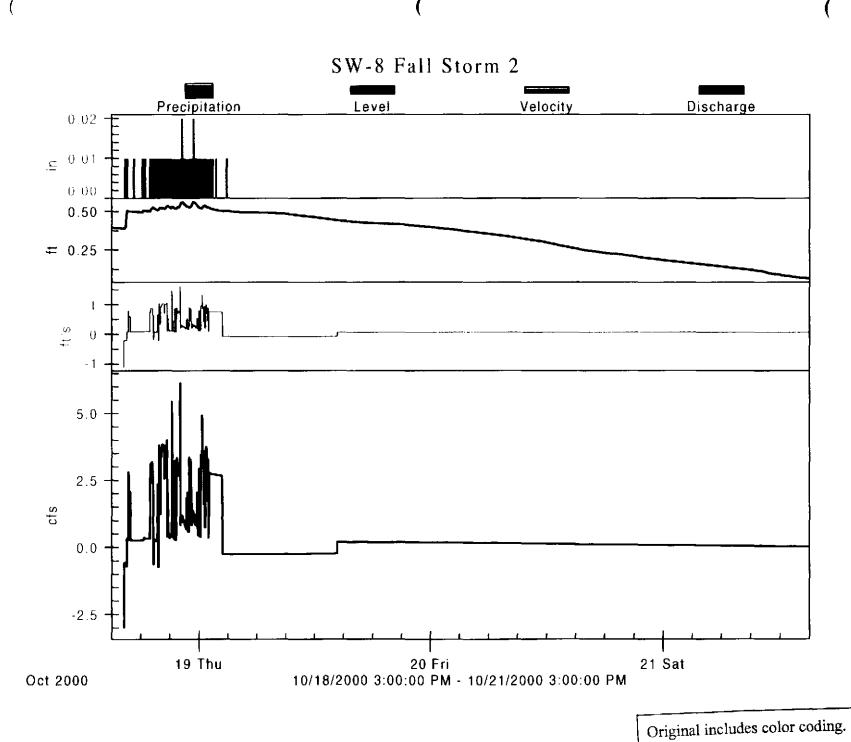


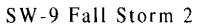


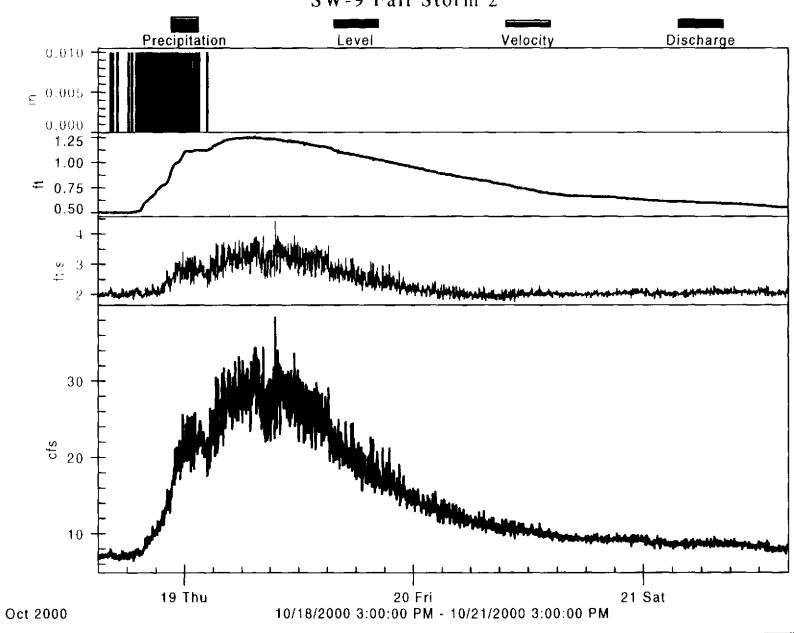






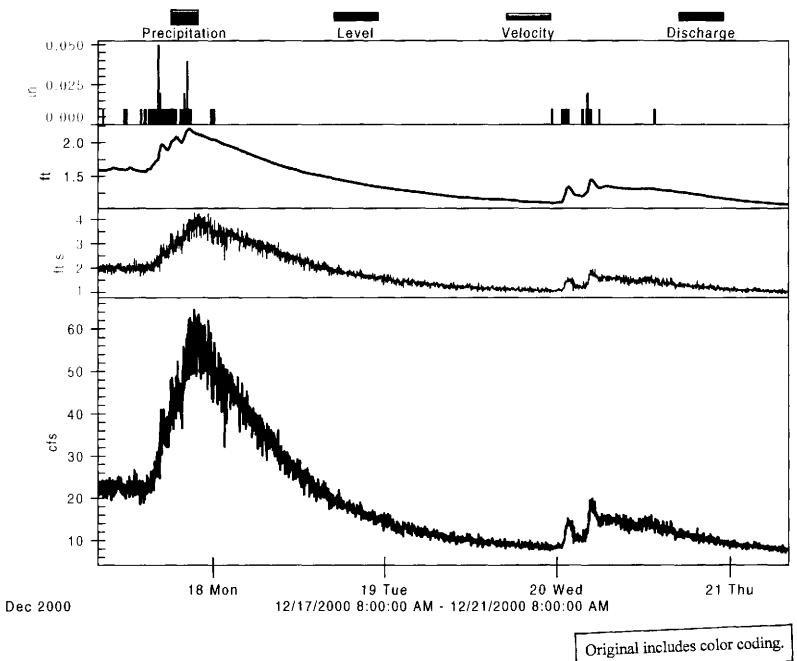






Post-Turnover Storm

SW-1 Post Turnover Event



SW-4 Post Turnover Event Precipitation Discharge Level Velocity 0.050 ⊆ 0.025 0.000 2.5 **≠** 2.0 1.5 1.0 **∞ ⇒** 0.5 40 30 cfs 20 10

19 Tue

12/17/2000 8:00:00 AM - 12/21/2000 8:00:00 AM

0

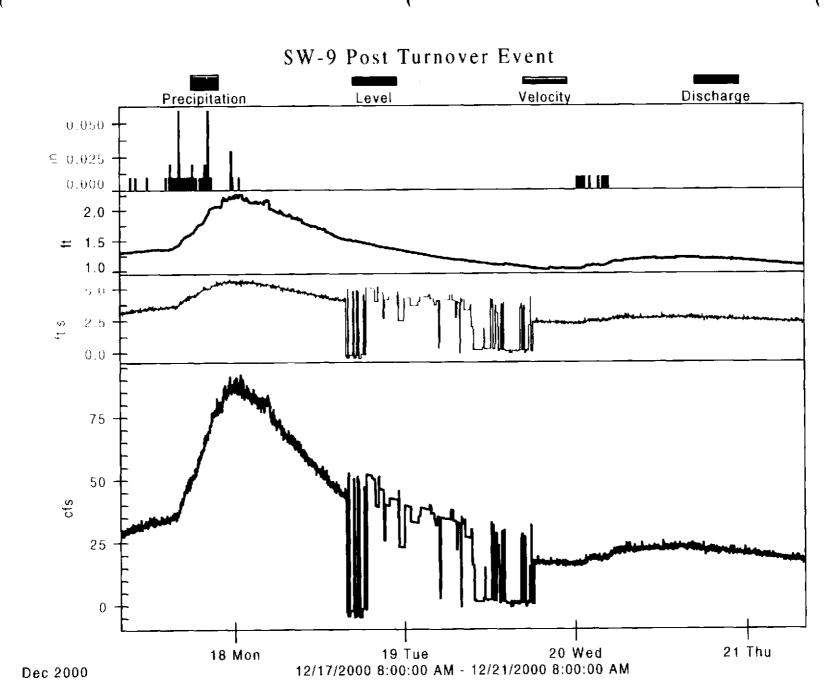
Dec 2000

18 Mon

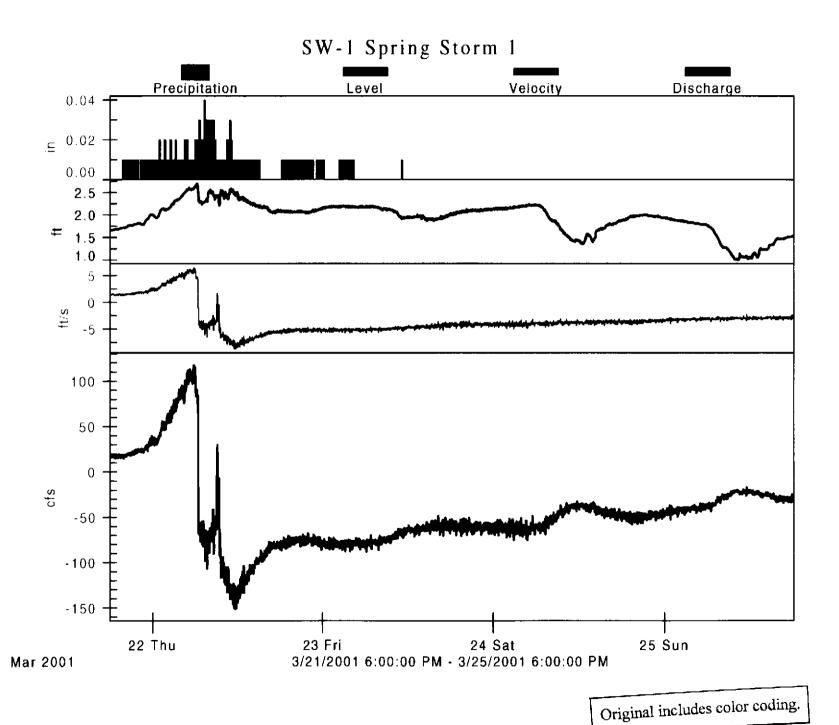
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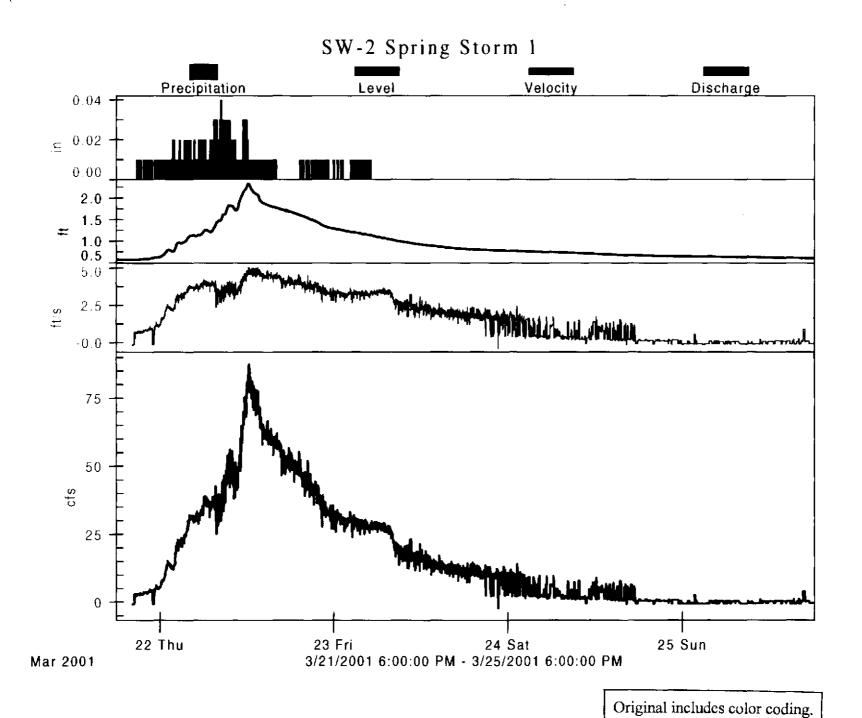
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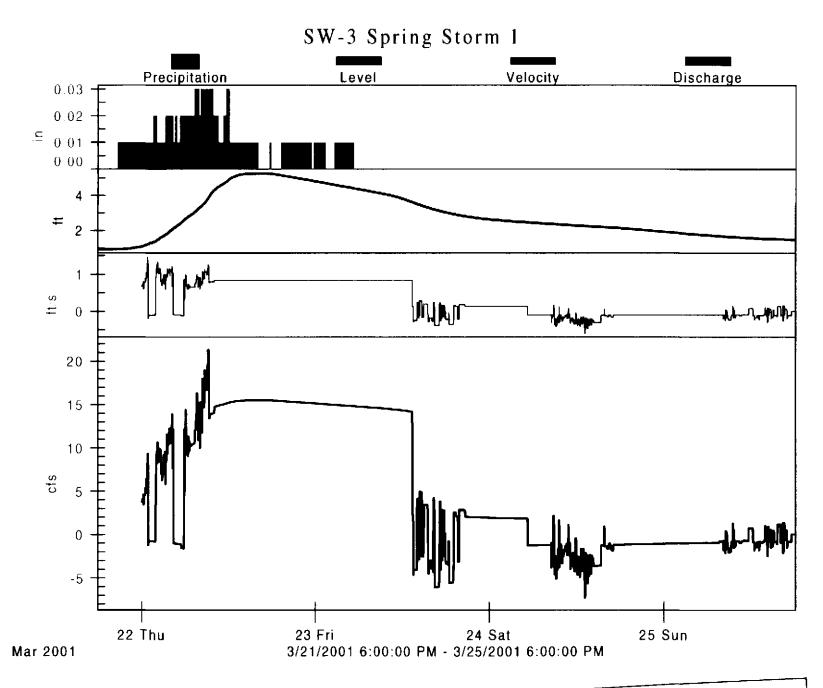
20 Wed

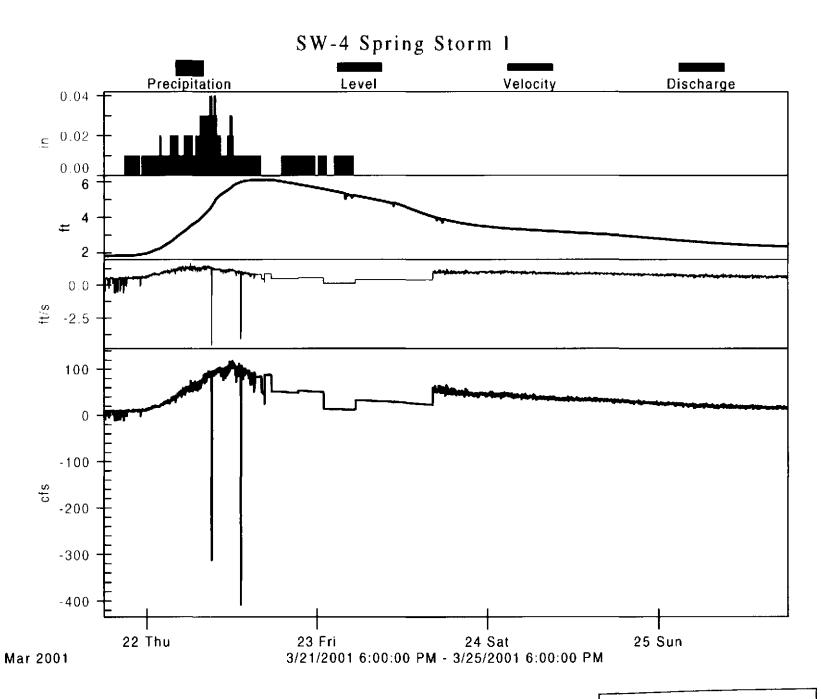


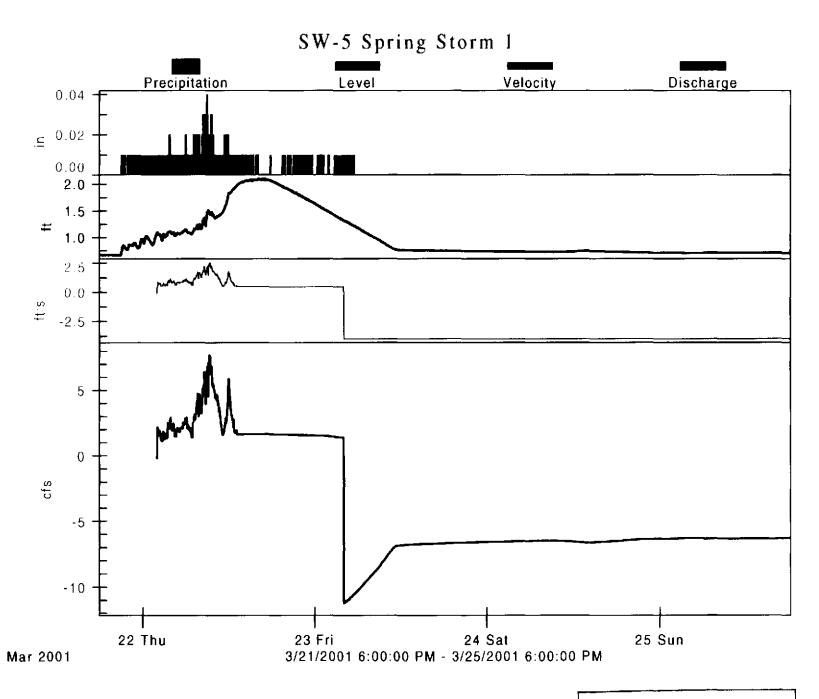
Spring Storm 1

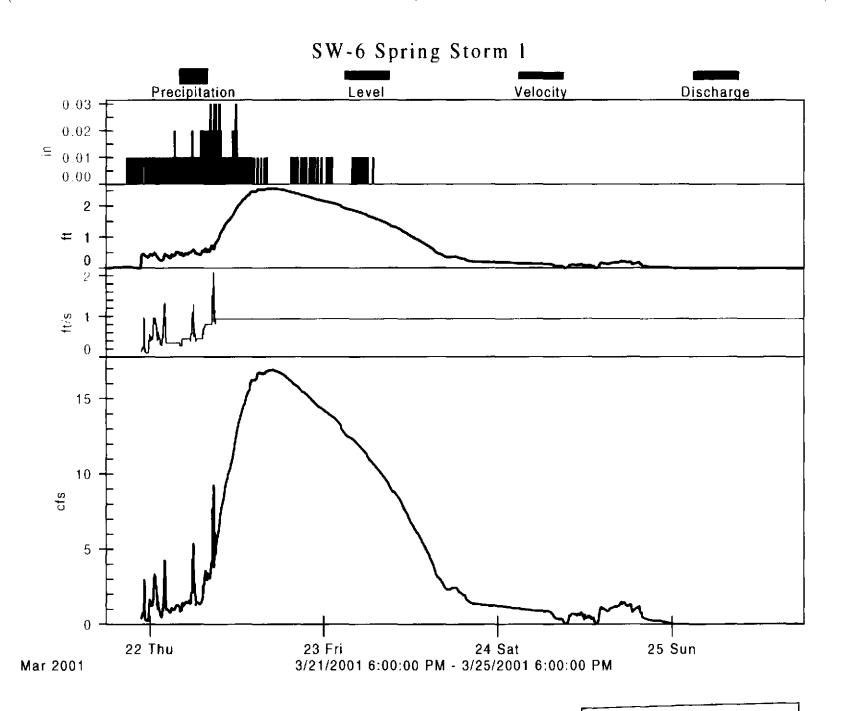


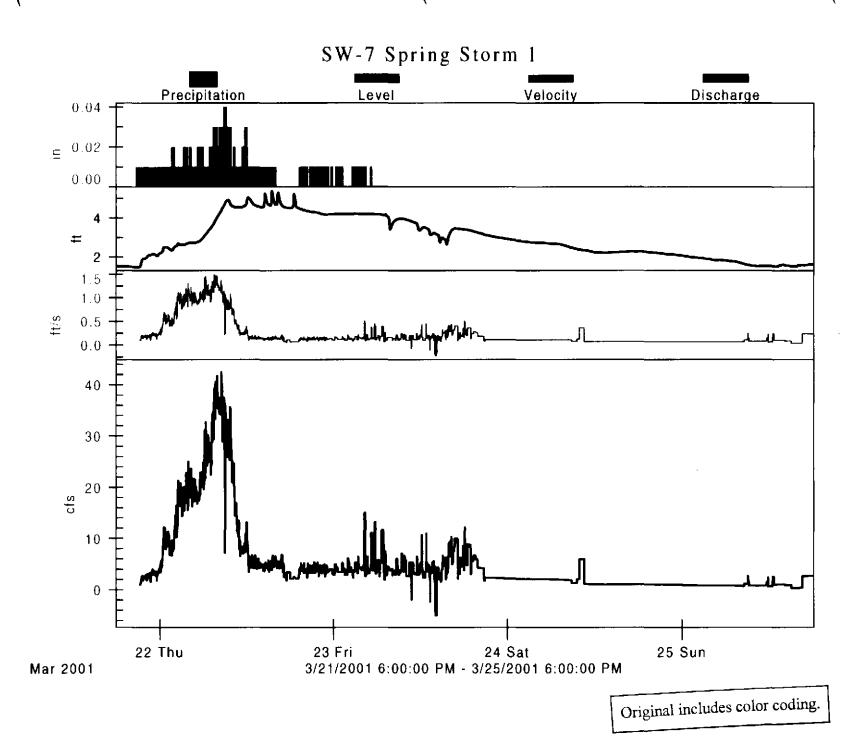


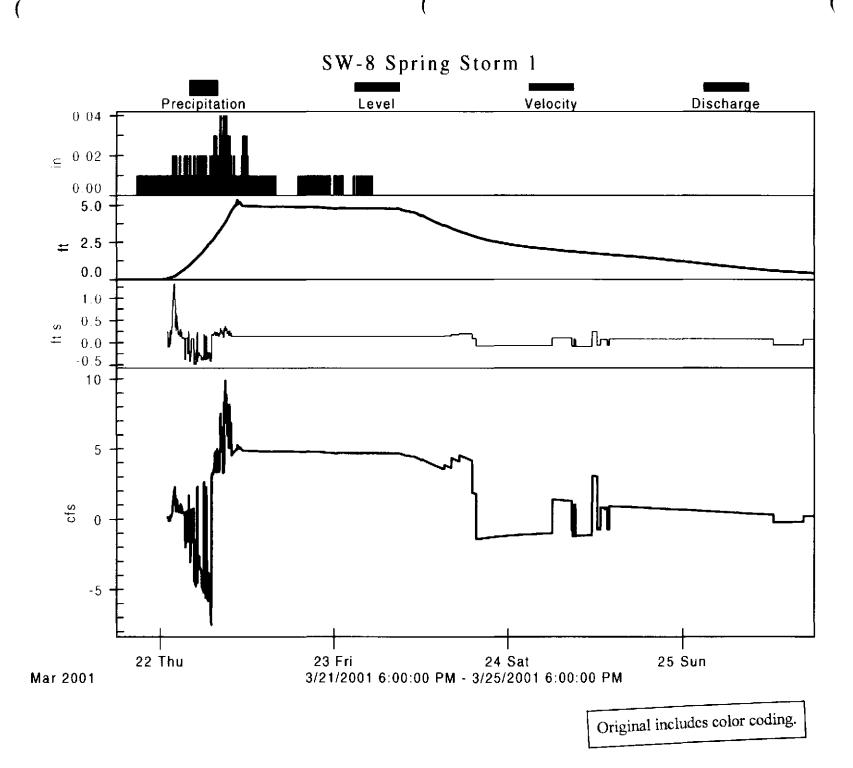


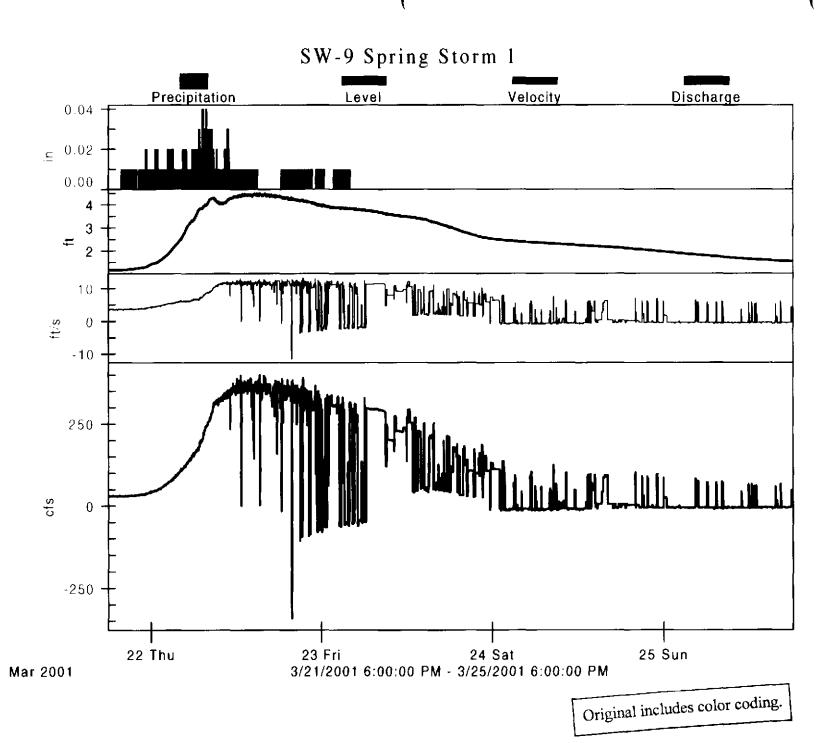




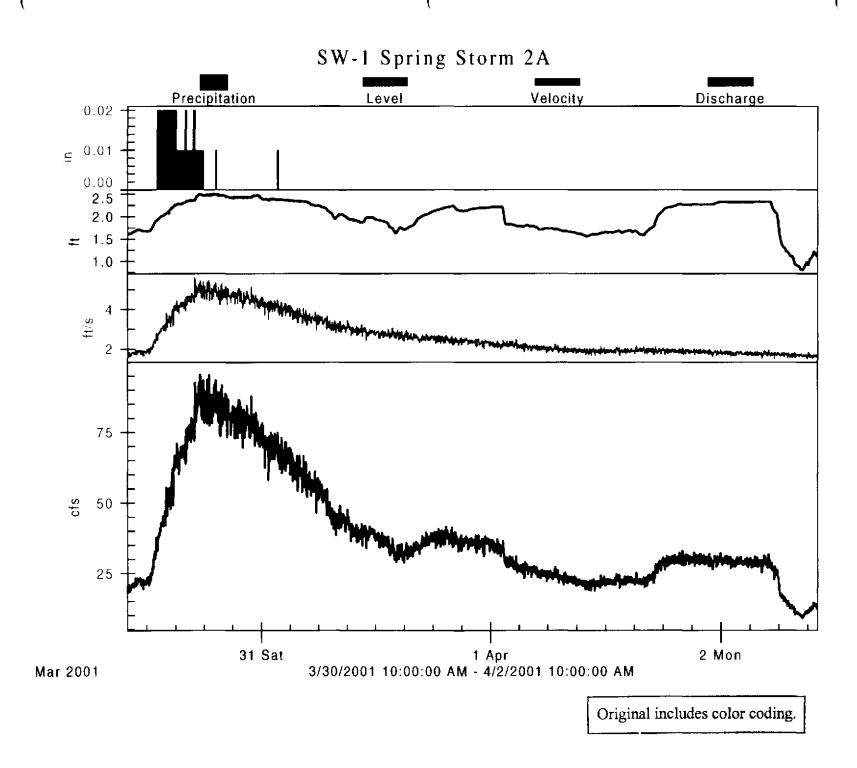




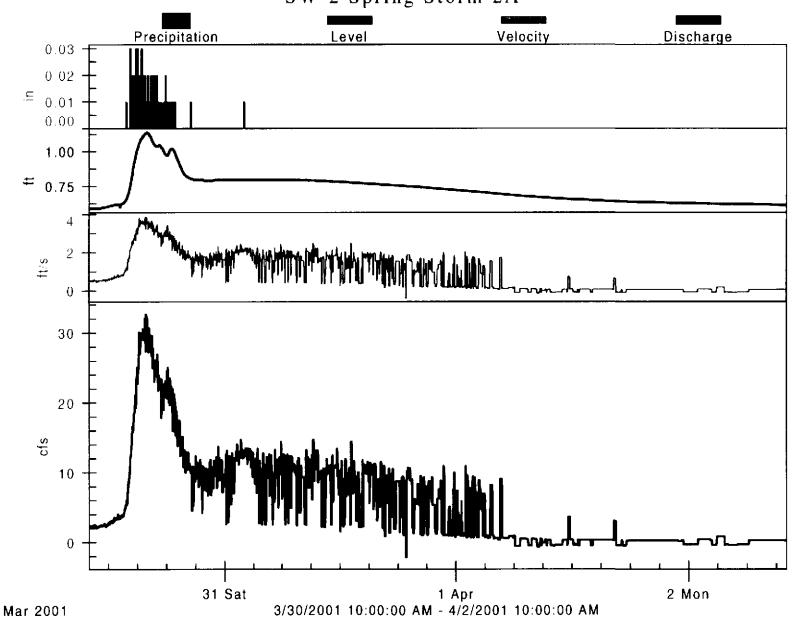


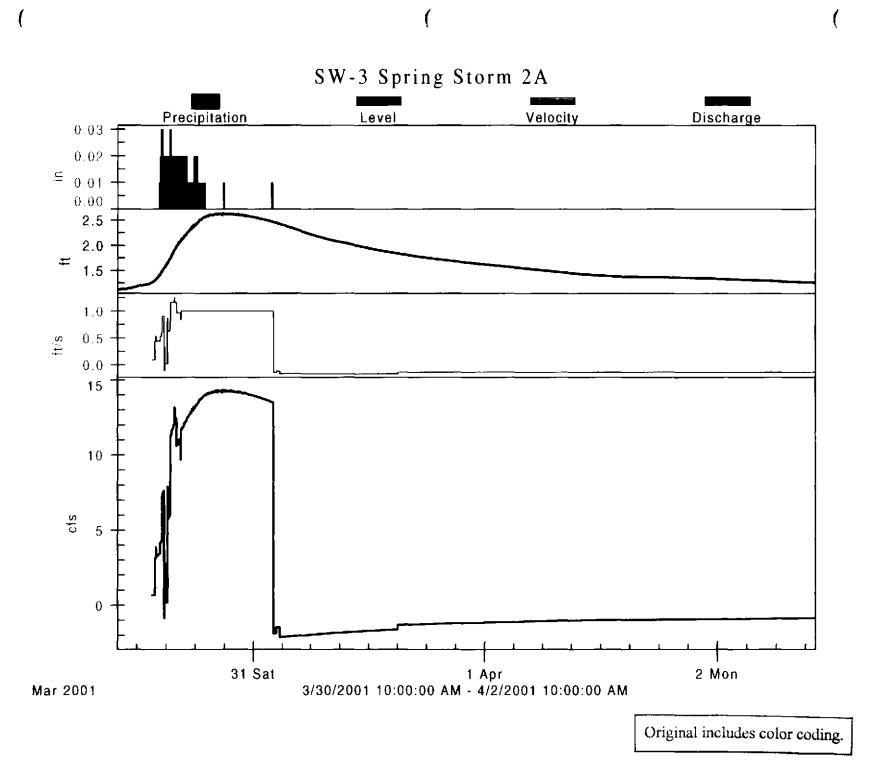


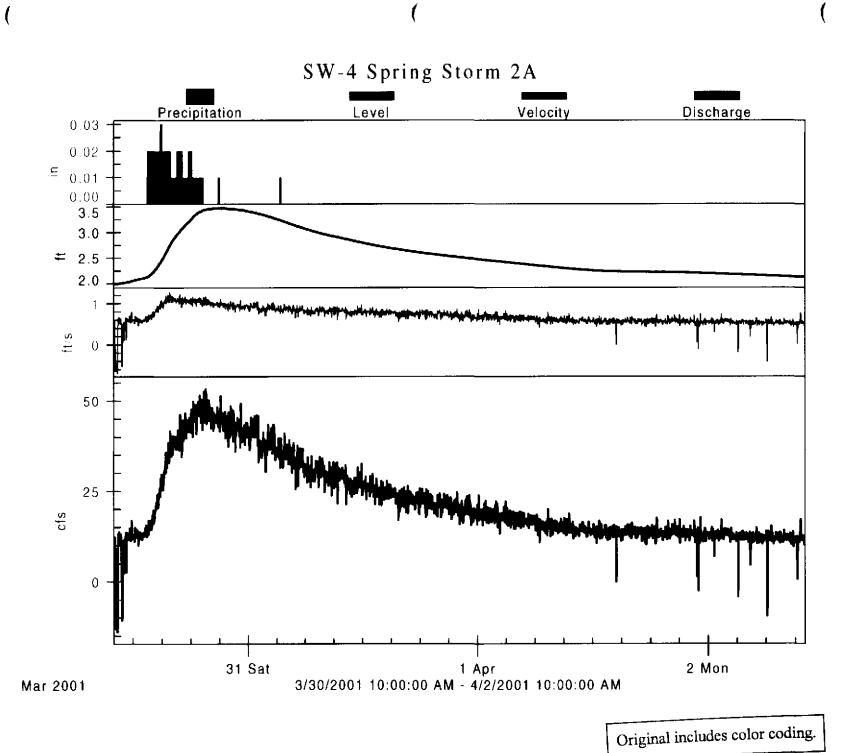
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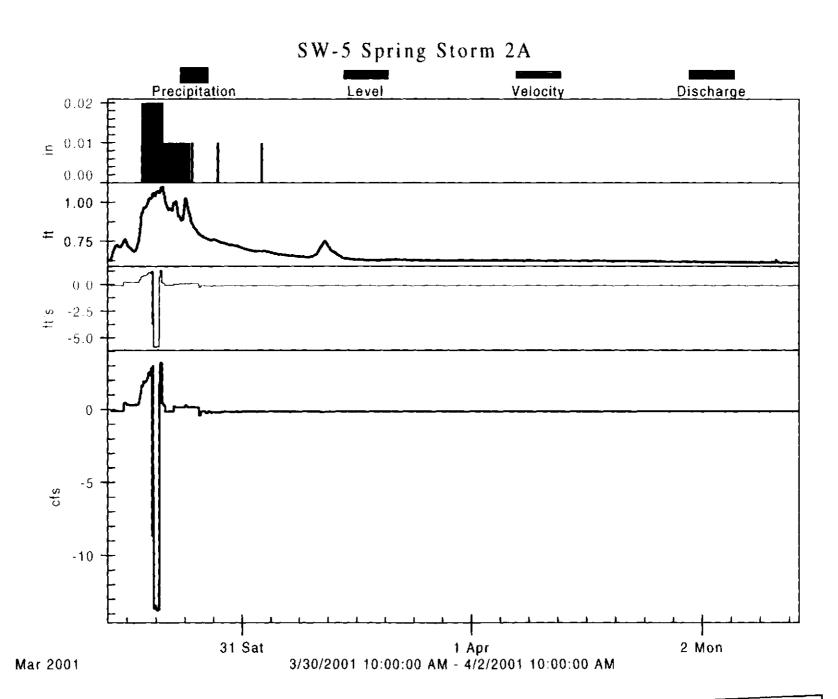


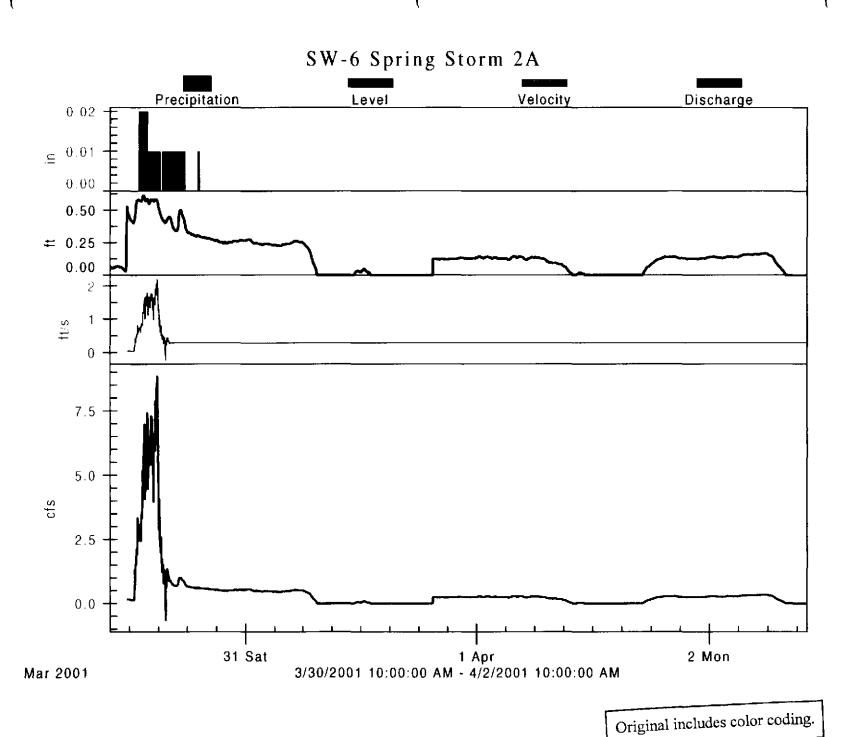
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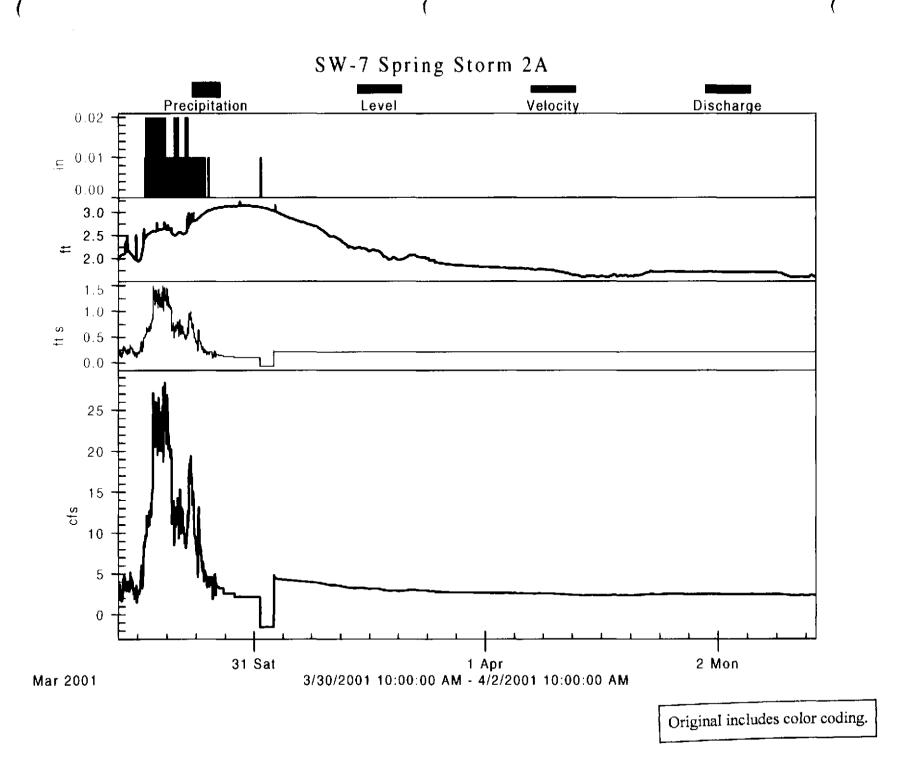




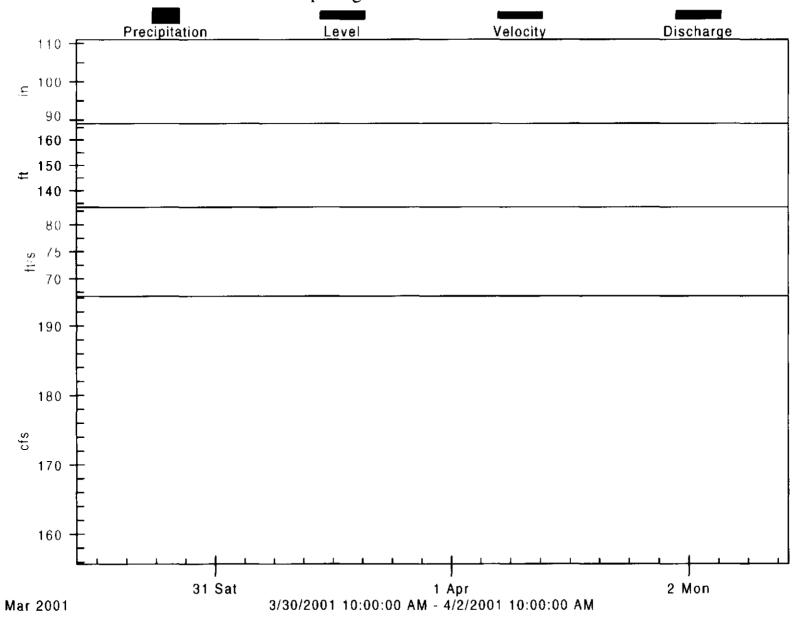


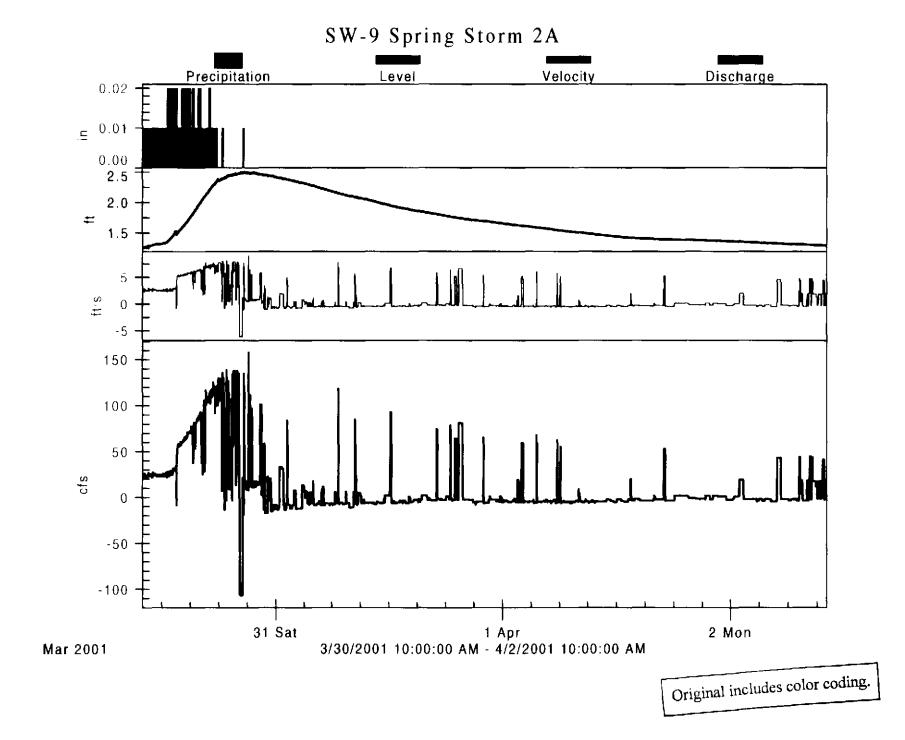






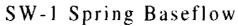
SW-8 Spring Storm 2A - No Data

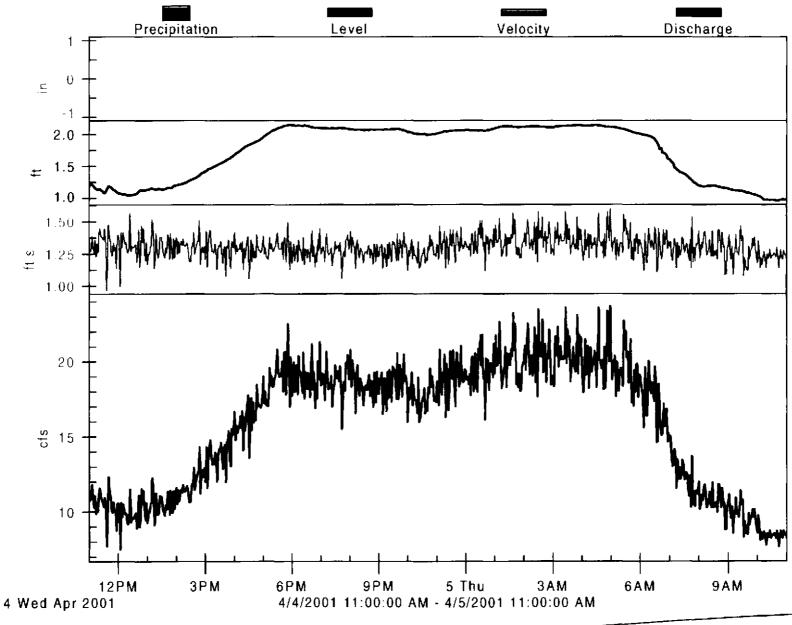


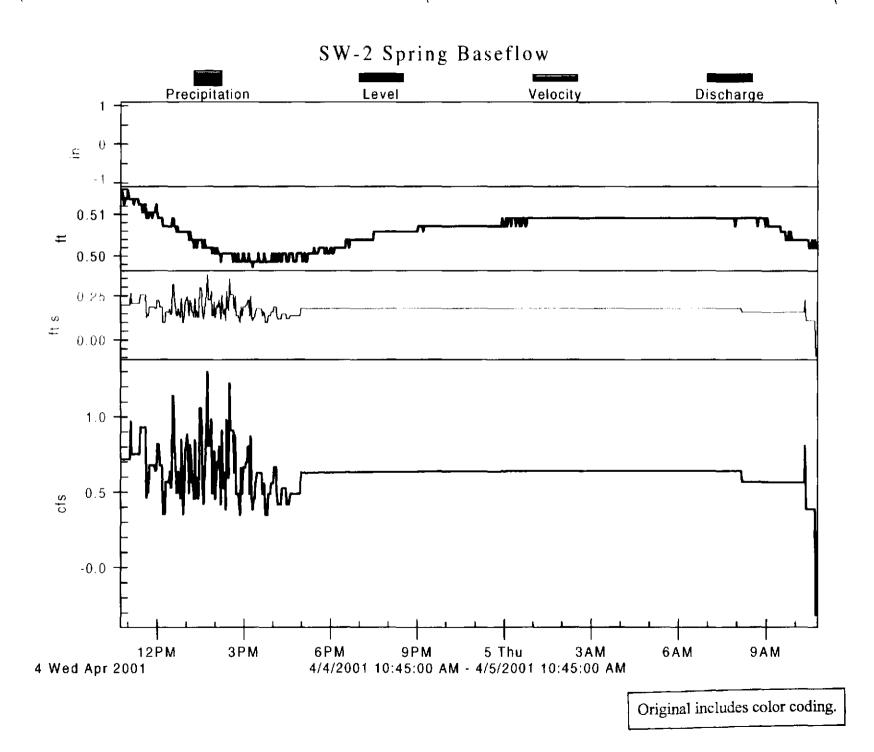


Spring Baseflow

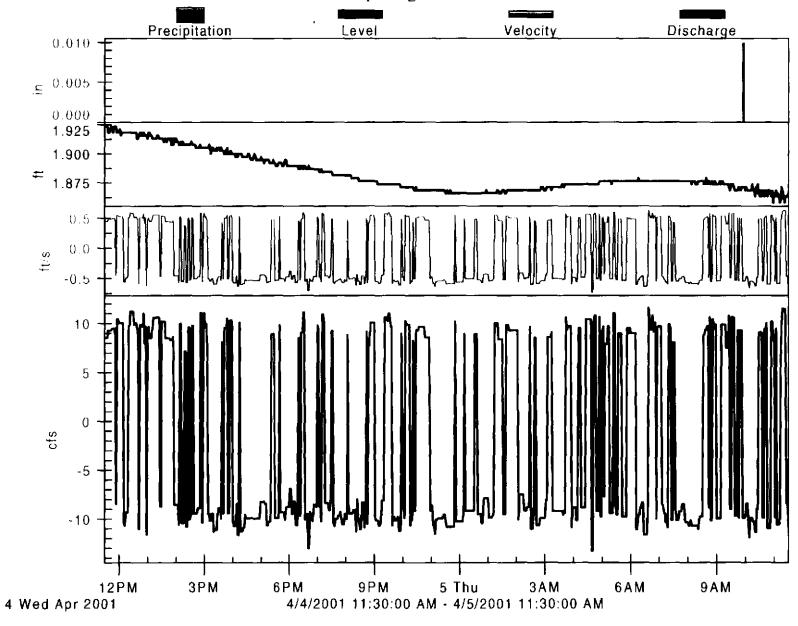
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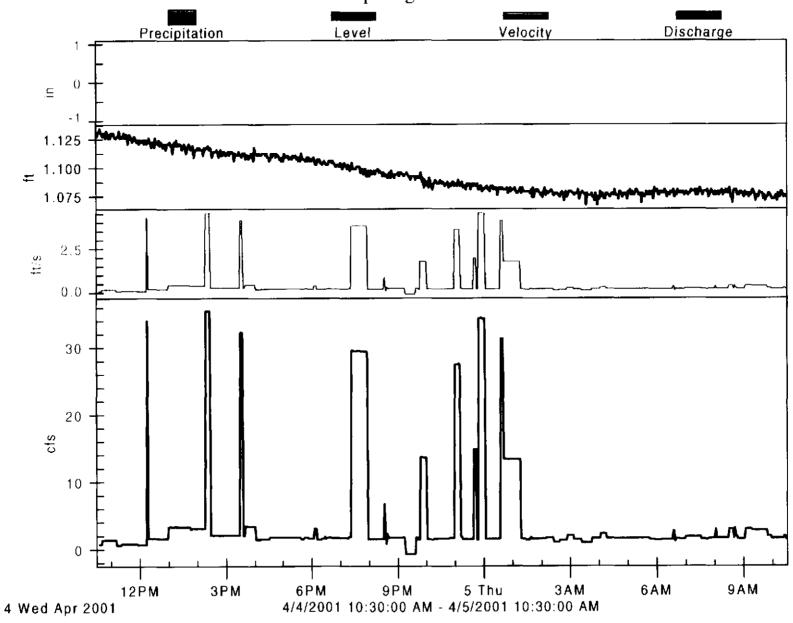




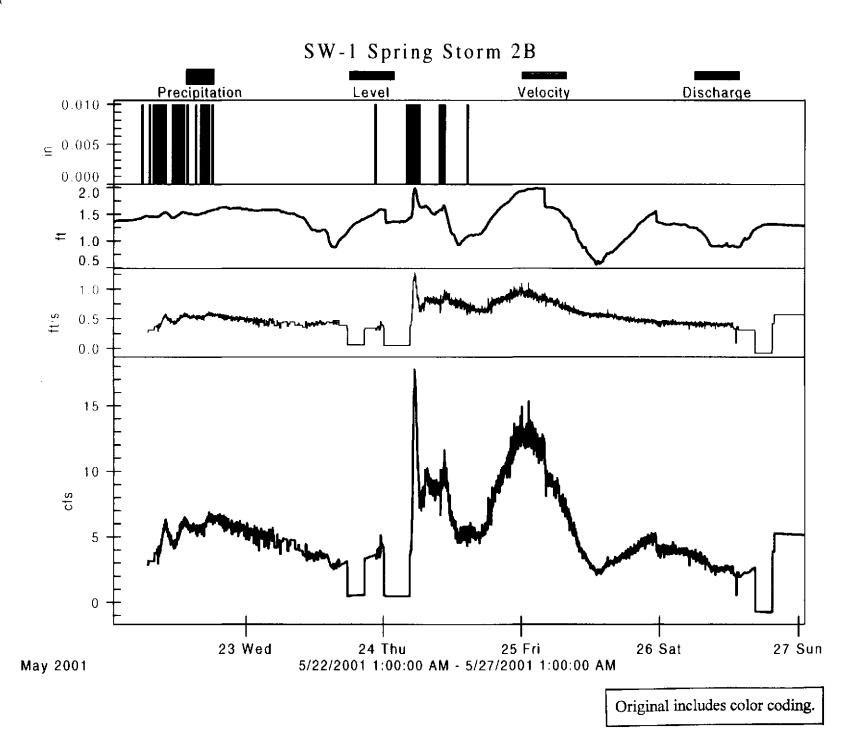
SW-4 Spring Baseflow

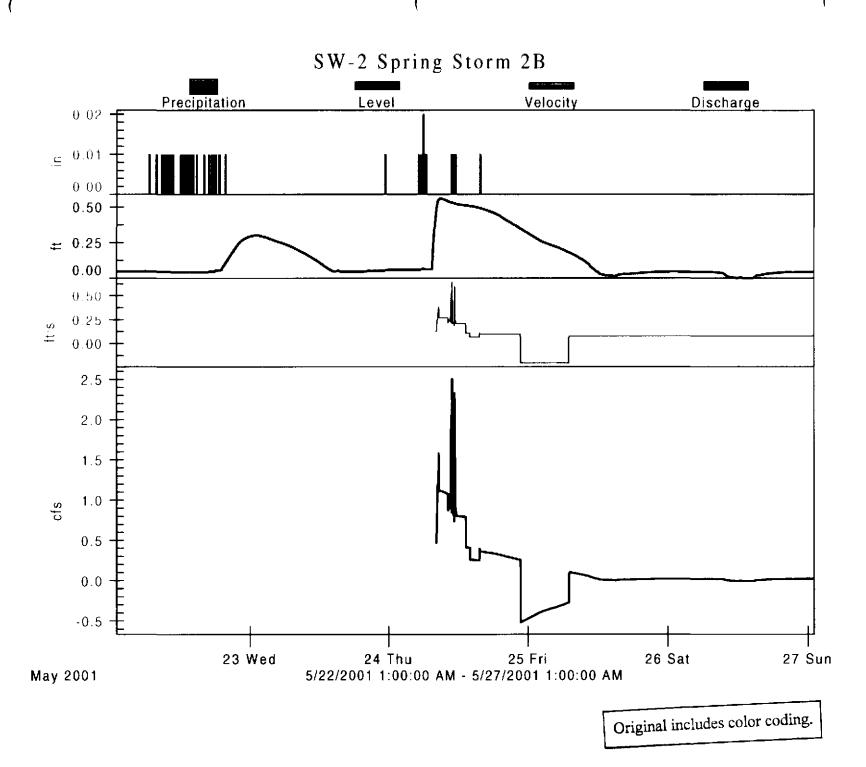


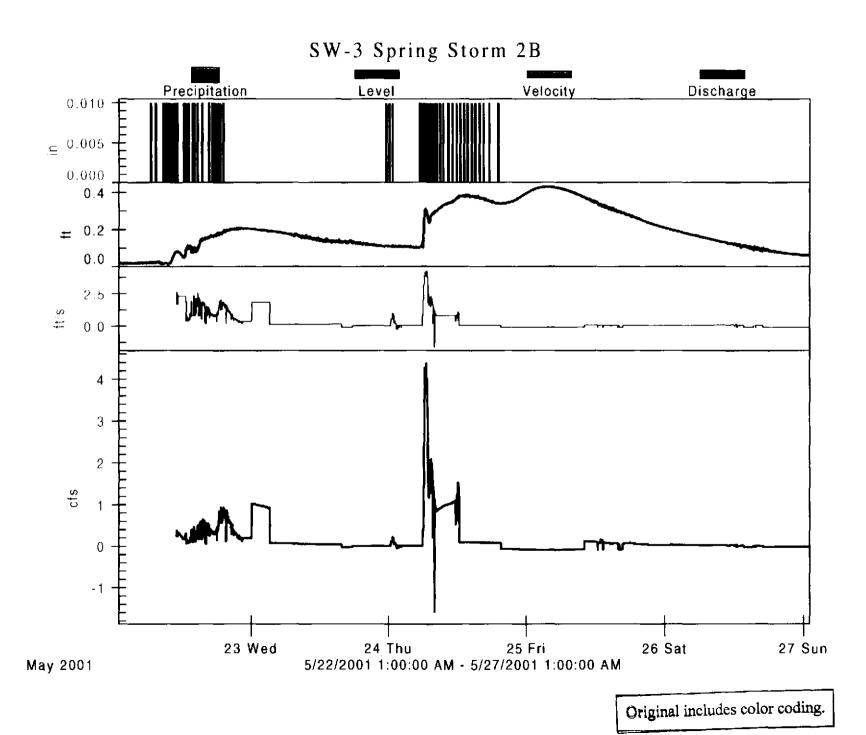
SW-9 Spring Baseflow

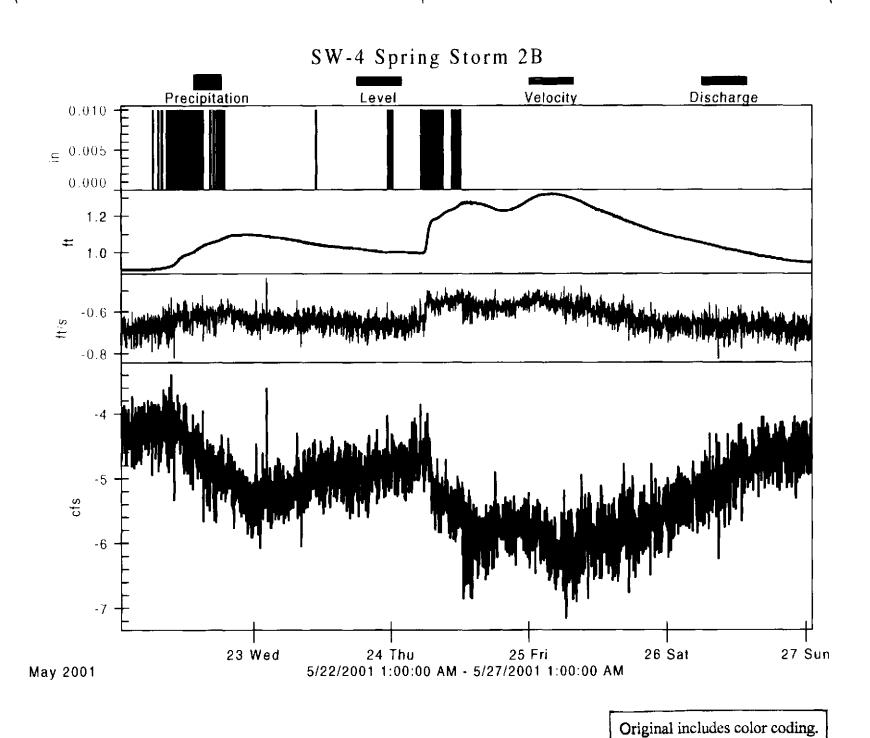


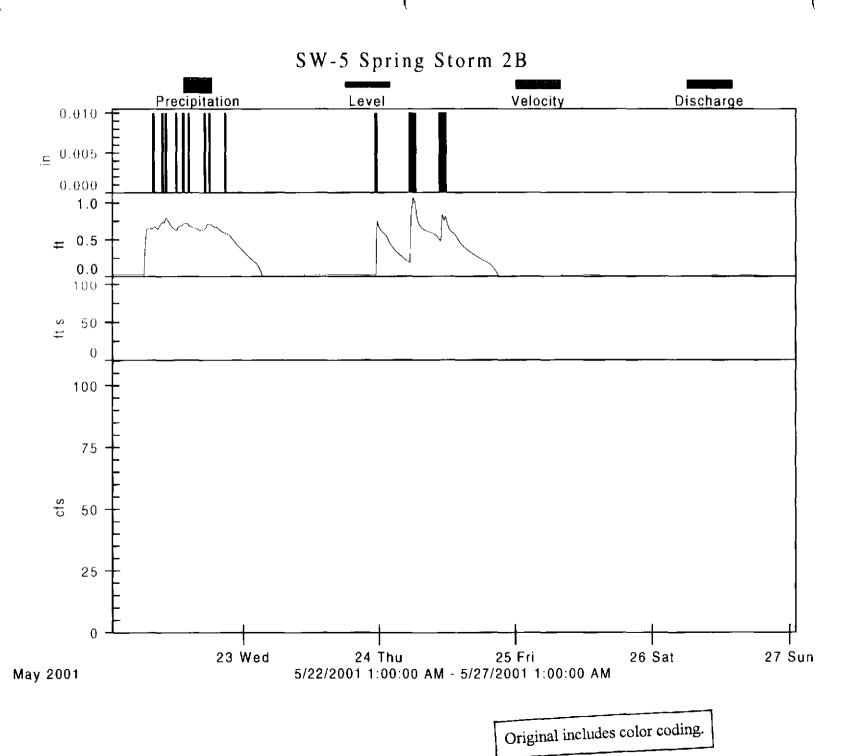
Spring Storm 2B



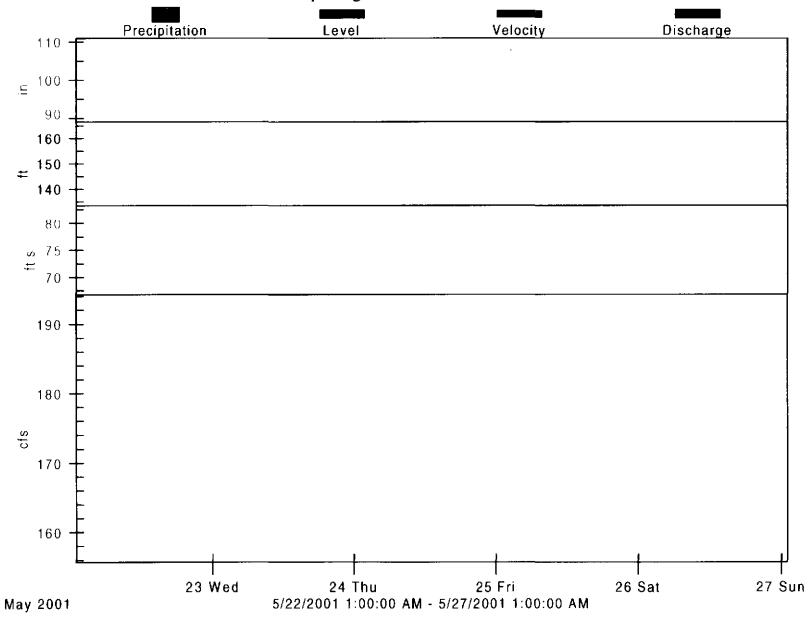




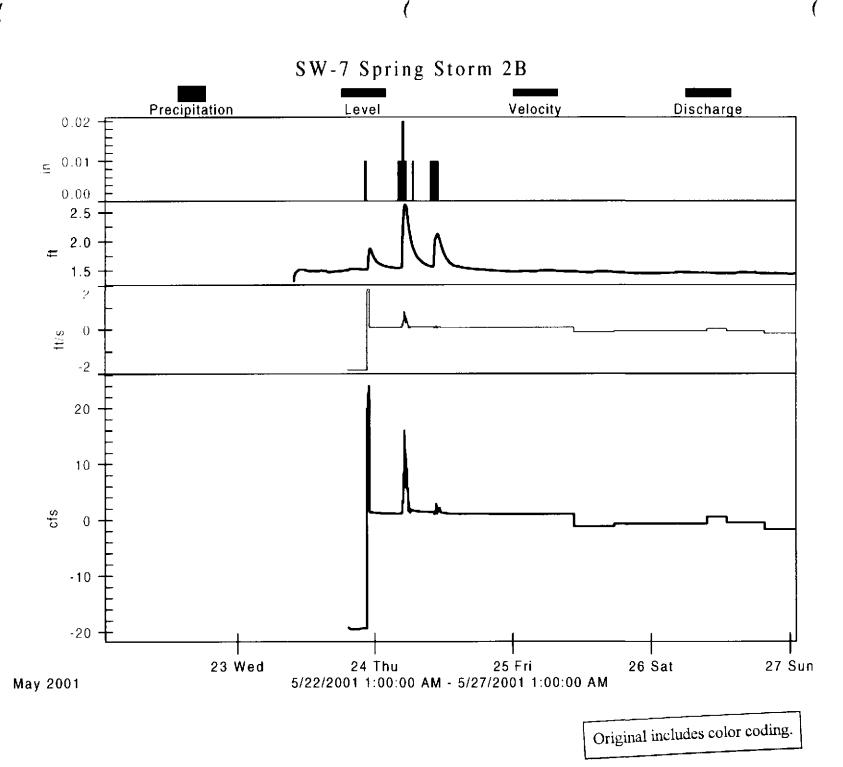


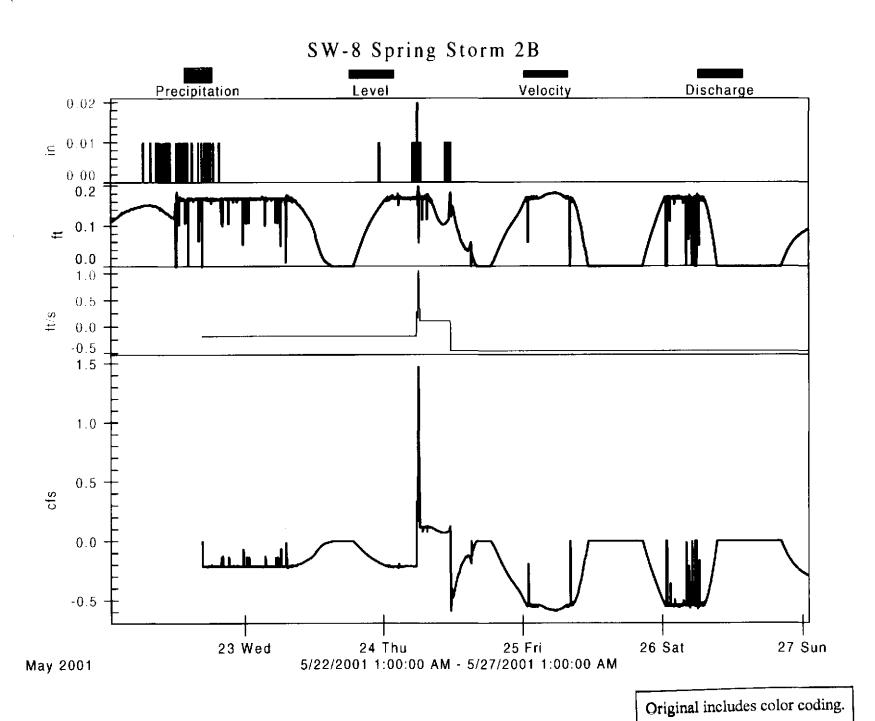


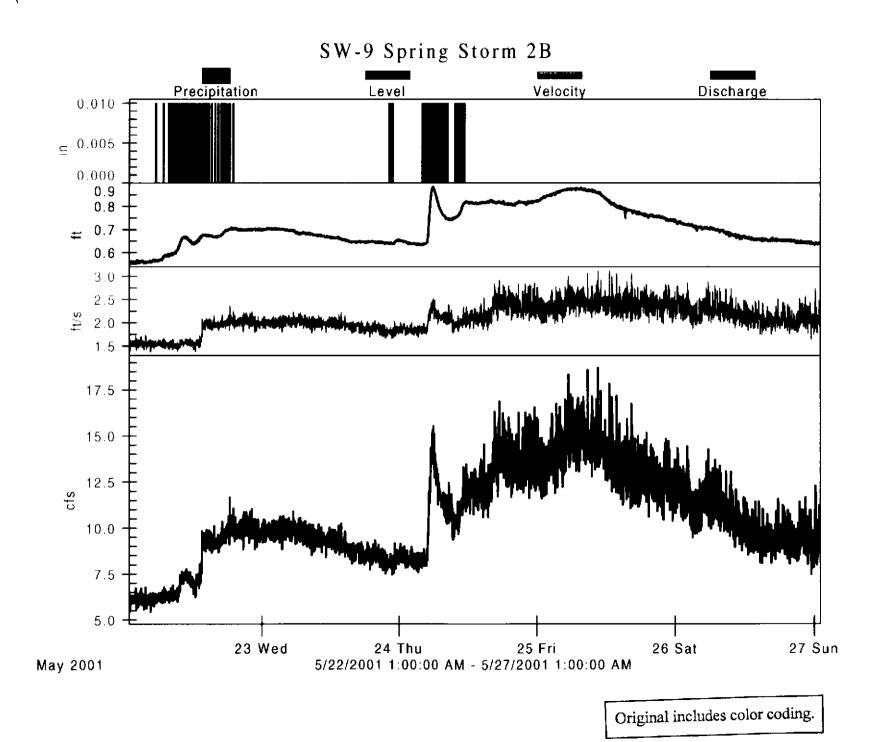
SW-6 Spring Storm 2B - No Data



Original includes color coding.







## APPENDIX I

Discharge Measurements

Stream Gauge Location	SW-1	Project Solutia
Date	8/30/00	Project Number 06626M32
Time	1653	
Gauging Methodology	Marsh-McBirney FloMate	
Field Conditions	Sunny; Dry 85 F	

Station (Stream Segment)	Depth (ft)	Length (ft)	Area (ft²)	Velocity (ft/sec)	Discharge Rate (ft ³ /sec)	Discharge Rate (gpm)
South End	0.6	1	0.6	0.04	0.024	10.77264
1	0.7	1	0.7	0.04	0.028	12.56808
2	0.7	1	0.7	0.03	0.021	9.42606
3	0.45	1	0.45	0.06	0.027	12,11922
4	0.45	1	0.45	0.06	0.027	12.11922
5	0.6	1	0.6	0.04	0.024	10.77264
6	0.6	1	0.6	0.05	0.03	13.4658
North End	0.6	1	0.05	0.01	0.0005	0.22443
			Total Di	scharge Rate:	0.1815	81.4680

Additional Field Notes:

Depth = Depth of water at the segment midpoint Length = Width of segment Area = Area of segment (Depth x Length)  $1 \text{ ft}^3 = 7.481 \text{ gallons}$ ft = feet

sec = second

Stream Gauge Location	SW-1	Project Solutia	
Date	9/19/00	Project Number 06626M32	
Time Time	1445		
Gauging Methodology	Marsh-McBirney FloMate		
Field Conditions	Sunny; Dry 70 F		

Station (Stream Segment)	Depth (ft)	Length	Area (ft²)	Velocity (ft/sec)	Discharge Rate (ft³/sec)	Discharge Rate (gpm)
0	0.7	1	0.7	0.17	0.119	53.41434
1	0.8	1	0.8	0.22	0.176	78.99936
2	0.6	1	0.6	0.17	0.102	45.78372
3	0.6	1	0.6	0.23	0.138	61.94268
4	0.75	1	0.75	0.23	0.1725	77,42835
5	0.7	1	0.7	0.21	0.147	65.98242
6	0.7	1	0.7	0.2	0.14	62.8404
7	0.7	1	0.7	-0.04	-0.028	-12,56808
			Total Di	scharge Rate:	0.9665	433.82319

Additional Field Notes:

Depth = Depth of water at the segment midpoint Length = Width of segment Area = Area of segment (Depth x Length) 1  $\text{ft}^3$  = 7.481 gallons ft = feet sec = second

Stream Gauge Location	SW-1	Project Solutia	
Date	10/4/00	Project Number 06626M32	
Time	1230		
Gauging Methodology	Marsh-McBirney FloMate		
Field Conditions			

Station (Stream Segment)	Depth (ft)	Length (ft)	Area (ft²)	Velocity (ft/sec)	Discharge Rate (ft³/sec)	Discharge Rate (gpm)
0	0.5	1	0.5	0.11	0.055	24.6873
1	0.65	1	0.65	0.15	0.0975	43.76385
2	0.55	1_	0.55	0.12	0.066	29.62476
3	0.45	1	0.45	0.22	0.099	44.43714
4	0.45	1	0.45	0.22	0.099	44.43714
5	0.6	1	0.6	0.16	0.096	43.09056
6	0.6	1	0.6	0.08	0.048	21.54528
7	0.6	0.7	0.42	-0.03	-0.0126	-5.655636
		]	Total Dis	scharge Rate:	0.5479	245.930394

Additional Field Notes:

Depth = Depth of water at the segment midpoint

Length = Width of segment

Area = Area of segment (Depth x Length)

 $1 \text{ ft}^3 = 7.481 \text{ gallons}$ 

ft = feet

sec = second

Stream Gauge Location	SW-1	Project Solutia	
Date	10/19/00	Project Number 06626M32	
Time	1315		
Gauging Methodology	Marsh-McBirney FloMate		
Field Conditions	Sunny; Dry 60 F		

Station (Stream Segment)	Depth (ft)	Length (ft)	Area (ft²)	Velocity (ft/sec)	Discharge Rate (ft³/sec)	Discharge Rate (gpm)
0	1.3	1	1.3	0.78	1.014	455.14404
1	1.4	1	1.4	1.06	1.484	666.10824
2	1.4	1	1.4	0.73	1.022	458.73492
3	1.25	1	1.25	0.99	1.2375	555.46425
4	1.25	1	1.25	1.29	1.6125	723.78675
5	1.4	1	1.4	1.43	2.002	898.61772
6	1.4	1	1.4	1.24	1.736	779.22096
7	1.45	1	1.45	0.63	0.9135	410.03361
		<u> </u>	Total Di	scharge Rate:	11.0215	4947.11049

Additional Field Notes:

Depth = Depth of water at the segment midpoint Length = Width of segment

Area = Area of segment (Depth x Length)

 $1 \text{ ft}^3 = 7.481 \text{ gallons}$ 

ft = feet

sec = second

Stream Gauge Location	SW-1	Project Solutia
Date	11/10/00	Project Number 06626M32
Time	1115	
Gauging Methodology	Marsh-McBirney FloMate	
Field Conditions L	ight rain, 50-55 F	

Station (Stream Segment)	Depth (ft)	Length (ft)	Area (ft²)	Velocity (ft/sec)	Discharge Rate (ft ³ /sec)	Discharge Rate (gpm)
0	0.65	1	0.65	-0.07	-0.0455	-20.42313
1	0.65	1	0.65	0.23	0.1495	67.10457
2	0.65	1	0.65	1.13	0.7345	329.68767
3	0.7	1	0.7	1.2	0.84	377.0424
4	0.7	1	0.7	1.2	0.84	377.0424
5	0.7	1	0.7	1.3	0.91	408.4626
6	0.7	1	0.7	0.51	0.357	160.24302
7	0.7	1	0.7	-0.01	-0.007	-3.14202
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			Total Di	scharge Rate:	3.7785	1696.01751

Additional Field Notes:

Depth = Depth of water at the segment midpoint Length = Width of segment Area = Area of segment (Depth x Length)

 $1 \text{ ft}^3 = 7.481 \text{ gallons}$ 

ft = feet

sec = second

Stream Gauge Location	SW-1	Project Solutia
Date	3/30/01	Project Number 06626M32
Time _	1225	
Gauging Methodology	Marsh-McBirney FloMate	
Field Conditions S	Snow, 31 F	

Station (Stream Segment)	Depth (ft)	Length (ft)	Area (ft²)	Velocity (ft/sec)	Discharge Rate (ft ³ /sec)	Discharge Rate (gpm)
1	1.7	1	1.7	1.21	2.057	923.30502
2	1.7	1	1.7	1.56	2.652	1190.37672
3	1.7	11	1.7	1.85	3.145	1411.6647
4	1.7	1	1.7	1.89	3.213	1442.18718
5	1.7	1	1.7	2.01	3.417	1533.75462
6	1.7	1	1.7	2.22	3.774	1693.99764
7	1.7	1	1.7	2.15	3.655	1640.5833
			Total Dis	charge Rate:	21.913	9835.8691

Additional Field Notes:

Depth = Depth of water at the segment midpoint Length = Width of segment Area = Area of segment (Depth x Length) I st³ = 7.481 gallons

ft = feet

sec = second

Stream Gauge Location	SW-1	Project Solutia
Date	4/5/01	Project Number 06626M32
Time	1125	
Gauging Methodology	Marsh-McBirney FloMate	
Field Conditions	Sunny, 60F	
ricia Conamons	Sumy, our	

Station (Stream Segment)	Depth (ft)	Length (ft)	Area (ft²)	Velocity (ft/sec)	Discharge Rate (ft ³ /sec)	Discharge Rate (gpm)
0	1.6	1	1.6	0.77	1.232	552.99552
1	1.5	1	1.5	1.32	1.98	888.7428
2	1.8	1	1.8	1.17	2.106	945.29916
3	1.7	1	1.7	1.26	2.142	961.45812
4	1.6	1	1.6	1.29	2.064	926.44704
5	1.8	1	1.8	1.13	2.034	912.98124
6	1.5	1	1.5	0.84	1.26	565.5636
7	1.5	1	1.5	0.46	0.69	309.7134
			Total Discl	narge Rate:	13.508	6963.2009

Additional Field Notes:

Depth = Depth of water at the segment midpoint

Length = Width of segment

Area = Area of segment (Depth x Length)

 $1 \text{ ft}^3 = 7.481 \text{ gallons}$ 

ft = feet

sec = second

Stream Gauge Location	SW-1	Project Solutia
Date	5/22/01	Project Number 06626M32
Time	1350	- ·
Gauging Methodology	Marsh-McBirney FloMate	
Field Conditions	Light rain, 60 F	<u> </u>

Station (Stream Segment)	Depth (ft)	Length (ft)	Area (ft²)	Velocity (ft/sec)	Discharge Rate (ft ³ /sec)	Discharge Rate (gpm)
1	1.1	1	1.1	0.18	0.198	88.87428
2	1 1	1	1.1	0.27	0.297	133.31142
3	1.3	1	1.3	0.42	0.546	245.07756
4	1.4	1	1.4	0.47	0.658	295.34988
5	1.5	1	1.5	0.4	0.6	269.316
6	1.3	1	1.3	0.45	0.585	262.5831
7	1.2	1	1.2	0.2	0.24	107.7264
8	0.9	1	0.9	0.13	0.117	52.51662
			Total Disch	iarge Rate:	3.241	1454.7553

Additional Field Notes:

Depth = Depth of water at the segment midpoint

Length = Width of segment

Area = Area of segment (Depth x Length)

 $1 \text{ ft}^3 = 7.481 \text{ gallons}$ 

ft = feet

sec = second

Stream Gauge Location	SW-2	Project Solutia
Date	9/15/00	Project Number 06626M32
Time	1200	
Gauging Methodology	Marsh-McBirney FloMate	
Field Conditions	Rainy, 60 F	

Station (Stream Segment)	Depth (ft)	Length (ft)	Area (ft²)	Velocity (ft/sec)	Discharge Rate (ft³/sec)	Discharge Rate (gpm)
1	0.65	2	1.3	0.563	0.7319	328.520634
2	0.65	2	1.3	0.603	0.7839	351.861354
3	0.65	2	1.3	0.423	0.5499	246.828114
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			Total Dis	charge Rate:	2.0657	927.210102

Additional Field Notes:

Stream Gauge Location	SW-2	Project Solutia
Date	10/19/00	Project Number 06626M32
Time	1140	<del></del>
Gauging Methodology	Marsh-McBirney FloMate	
	Sunny; Dry 60 F	

Station (Stream Segment)	Depth (ft)	Length (ft)	Area (ft²)	Velocity (ft/sec)	Discharge Rate (ft³/sec)	Discharge Rate (gpm)
0	0.4	1	0.4	-0.04	-0.016	-7.18176
1	0.4	1	0.4	0.01	0.004	1.79544
2	0.4	1	0.4	0.05	0.02	8.9772
3	0.4	1	0.4	0.04	0.016	7.18176
4	0.4	1	0.4	0.05	0.02	8.9772
5	0.45	1	0.45	0.04	0.018	8.07948
6	0.45	1	0.45	0.01	0.0045	2.01987
7	0.45	ı	0.45	0.02	0.009	4.03974
			Total Dis	scharge Rate:	0.0755	33.88893

Additional Field Notes:

Stream Gauge LocationSV	V-2	Project Solutia	
Date 3/2	2/01	Project Number 06626M32	
Time 12	45		
Gauging Methodology Marsh-McBi	rney FloMate		
Field Conditions Rainy, 50 F			

Station (Stream Segment)	Depth (ft)	Length (ft)	Area (ft²)	Velocity (ft/sec)	Discharge Rate (ft³/sec)	Discharge Rate (gpm)
1	1.62	1	1.62	0.63	1.0206	458.106516
2	1.62	1	1.62	2.97	4.8114	2159.645004
3	1.62	1	1.62	3.3	5.346	2399.60556
4	1.62	1	1.62	3.71	6.0102	2697.738372
5	1.62	1	1.62	3.6	5.832	2617.75152
6	1.62	1	1.62	3.9	6.318	2835.89748
7	1.62	1	1.62	3.45	5.589	2508.67854
8	1.62	1	1.62	1.81	2.9322	1316.147292
			Total Di	scharge Rate:	37.8594	16993.5702

Additional Field Notes:

Depth = Depth of water at the segment midpoint Length = Width of segment Area = Area of segment (Depth x Length)  $1 \text{ ft}^3 = 7.481 \text{ gallons}$ 

ft = feet

sec = second

Stream Gauge Location	SW-2	Project Solutia
Date	3/30/01	Project Number 06626M32
Time	1300	<del></del>
Gauging Methodology	Marsh-McBirney FloMate	
Gauging Methodology Field Conditions		

Station (Stream Segment)	Depth (ft)	Length (ft)	Area (ft²)	Velocity (ft/sec)	Discharge Rate (ft ³ /sec)	Discharge Rate (gpm)
1	0.6	1	0.6	0	0	0
2	0.6	1	0.6	0.08	0.048	21.54528
3	0.6	1	0.6	0.65	0.39	175.0554
4	0.6	1	0.6	0.8	0.48	215.4528
5	0.6	1	0.6	0.93	0.558	250.46388
6	0.6	1	0.6	0.05	0.03	13.4658
7	0.6	1	0.6	0.31	0.186	83.48796
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<u> </u>	· · -		Total Dis	scharge Rate:	1.692	759.47112

Additional Field Notes:

Depth = Depth of water at the segment midpoint

Length = Width of segment

Area = Area of segment (Depth x Length)

 $1 \text{ ft}^3 = 7.481 \text{ gallons}$ 

ft = feet

sec = second

Stream Gauge Location	SW-3	Project Solutia	
Date	9/15/00	Project Number 06626M32	
Time	1110	<del></del>	
Gauging Methodology	Marsh-McBirney FloMate		
Field Conditions (	Overcast, light rain		

Station (Stream Segment)	Depth (ft)	Length (ft)	Area (ft²)	Velocity (ft/sec)	Discharge Rate (ft³/sec)	Discharge Rate (gpm)
1	2.1	5	11.45	0.387	4.43115	1988.965989
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			Total Dis	scharge Rate:	4.43115	1988.96598

Additional Field Notes:

Stream Gauge Location	SW-3	Project Solutia
Date	11/10/00	Project Number 06626M32
Time	1100	
Gauging Methodology N	Marsh-McBirney FloMate	
Field Conditions Li		

Station (Stream Segment)	Depth (ft)	Length (ft)	Area (ft²)	Velocity (ft/sec)	Discharge Rate (ft ³ /sec)	Discharge Rate (gpm)
1	1	5	5.3	1.22	6.466	2902.32876
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			Total Dis	scharge Rate:	6.466	2902.32876

Additional Field Notes:

Stream Gauge Location	SW-4	Project Solutia_
Date	8/30/00	Project Number 06626M32
Time	1708	
Gauging Methodology	Marsh-McBirney FloMate	
Field Conditions	Sunny; Dry 85 F	

Station (Stream Segment)	Depth (ft)	Length (ft)	Area (ft²)	Velocity (ft/sec)	Discharge Rate (ft³/sec)	Discharge Rate (gpm)
1	0.3	1	0.3	-0.01	-0.003	-1.34658
2	0.4	1	0.4	0	0	0
3	0.5	1	0.5	0.03	0.015	6.7329
4	0.65	1	0.65	0.04	0.026	11.67036
5	0.7	1	0.7	0.03	0.021	9.42606
6	0.7	1	0.7	0.05	0.035	15.7101
7	0.7	1	0.7	0.05	0.035	15.7101
8	0.6	1	0.6	0.05	0.03	13.4658
9	0.6	1	0.6	0	0	0
10	0.45	1	0.45	-0.01	-0.0045	-2.01987
11	0.2	1	0.2	-0.01	-0.002	-0.89772
		<u> </u>	Total Di	scharge Rate:	0.1525	68.45115

Additional Field Notes:

Depth = Depth of water at the segment midpoint

Length = Width of segment Area = Area of segment (Depth x Length)

 $1 \text{ ft}^3 = 7.481 \text{ gallons}$ 

ft = feet

sec = second

Stream Gauge Location	SW-4	Project Solutia
Date _.	9/19/00	Project Number 06626M32
Time	1515	
Gauging Methodology	Marsh-McBirney FloMate	
Field Conditions	Sunny; Dry 70 F	<del>-</del>
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(ft)	Length (ft)	Area (ft²)	Velocity (ft/sec)	Rate (ft³/sec)	Discharge Rate (gpm)
0.4	1	0.4	-0.04	-0.016	-7.18176
0.4	1	0.4	-0.01	-0.004	-1.79544
0.5	1	0.5	0.03	0.015	6.7329
0.6	1	0.6	0.09	0.054	24.23844
0.75	1	0.75	0.18	0.135	60.5961
0.8	1	0.8	0.25	0.2	89.772
0.8	1	0.8	0.15	0.12	53.8632
0.75	1	0.75	0.21	0.1575	70.69545
0.65	1	0.65	0.1	0.065	29.1759
0.6	1	0.6	-0.03	-0.018	-8.07948
0.45	1	0.45	-0.04	-0.018	-8.07948
		-			
					309,93783
	0.4 0.5 0.6 0.75 0.8 0.8 0.75 0.65 0.6	0.4     1       0.5     1       0.6     1       0.75     1       0.8     1       0.8     1       0.75     1       0.65     1       0.6     1	0.4         1         0.4           0.5         1         0.5           0.6         1         0.6           0.75         1         0.75           0.8         1         0.8           0.75         1         0.75           0.65         1         0.65           0.6         1         0.6           0.45         1         0.45	0.4         1         0.4         -0.01           0.5         1         0.5         0.03           0.6         1         0.6         0.09           0.75         1         0.75         0.18           0.8         1         0.8         0.25           0.8         1         0.8         0.15           0.75         1         0.75         0.21           0.65         1         0.65         0.1           0.6         1         0.6         -0.03	0.4         1         0.4         -0.01         -0.004           0.5         1         0.5         0.03         0.015           0.6         1         0.6         0.09         0.054           0.75         1         0.75         0.18         0.135           0.8         1         0.8         0.25         0.2           0.8         1         0.8         0.15         0.12           0.75         1         0.75         0.21         0.1575           0.65         1         0.65         0.1         0.065           0.6         1         0.6         -0.03         -0.018           0.45         1         0.45         -0.04         -0.018

Additional Field Notes:

Depth = Depth of water at the segment midpoint Length = Width of segment Area = Area of segment (Depth x Length) 1  $ft^3 = 7.481$  gallons

ft = feet

sec = second

Stream Gauge Location	SW-4	Project Solutia
Date	10/4/00	Project Number 06626M32
Time	1255	
Gauging Methodology	Marsh-McBirney FloMate	
Field Conditions	Sunny; Dry 70 F	

Station	Depth	Length	Area	Velocity	Discharge Rate	Discharge Rate
(Stream Segment)	(ft)	(ft)	(ft²)	(ft/sec)	(ft³/sec)	(gpm)
0	0.4	1	0.4	-0.03	-0.012	-5.38632
1	0.3	1	0.3	-0.05	-0.015	-6.7329
2	0.3	1	0.3	-0.02	-0.006	-2.69316
3	0.35	1	0.35	-0.01	-0.0035	-1.57101
4	0.4	1	0.4	0.08	0.032	14.36352
5	0.5	1	0.5	0.03	0.015	6.7329
6	0.55	1	0.55	0.15	0.0825	37.03095
7	0.65	1	0.65	0.16	0.104	46.68144
8	0.65	1	0.65	0.12	0.078	35.01108
9	0.7	1	0.7	0.12	0.084	37.70424
10	0.7	1	0.7	0.11	0.077	34.56222
11	0.75	1	0.75	0.18	0.135	60.5961
12	0.75	1	0.75	0.08	0.06	26.9316
13	0.8	1	0.8	0.12	0.096	43.09056
14	0.7	1	0.7	0.13	0.091	40.84626
15	0.7	1	0.7	0.1	0.07	31.4202
16	0.6	1	0.6	0.04	0.024	10.77264
17	0.6	1	0.6	-0.04	-0.024	-10.77264
18	0.5	1	0.5	-0.01	-0.005	-2.2443
19	0.5	1	0.5	-0.05	-0.025	-11.2215
20	0.35	1	0.35	-0.08	-0.028	-12.56808
21	0.2	1	0.2	-0.06	-0.012	-5.38632
			Total Disc	charge Rate:	0.83	372.5538

Additional Field Notes:

Depth = Depth of water at the segment midpoint

Length = Width of segment

Area = Area of segment (Depth x Length)

1  $ft^3 = 7.481$  gallons

ft = feet

sec = second

Stream Gauge Location	SW-4	Project Solutia
Date	10/19/00	Project Number 06626M32
Time	1405	
Gauging Methodology	Marsh-McBirney FloMate	
Field Conditions	Sunny; Dry 60 F	

Station (Stream Segment)	Depth (ft)	Length (ft)	Area (ft²)	Velocity (ft/sec)	Discharge Rate (ft³/sec)	Discharge Rate (gpm)
0	1.4	1	1.4	-0.04	-0.056	-25.13616
2	1.3	1	1.3	0.27	0.351	157.54986
4	1.4	1	1.4	0.4	0.56	251.3616
6	1.6	1	1.6	0.3	0.48	215.4528
8	1.7	1	1.7	0.49	0.833	373.90038
10	1.7	1	1.7	0.34	0.578	259.44108
12	1.75	1	1.75	0.31	0.5425	243.50655
14	1.6	1	1.6	0.35	0.56	251.3616
16	1.6	1	1.6	0.33	0.528	236.99808
18	1.5	1	1.5	0.31	0.465	208.7199
20	1.35	1	1.35	0.12	0.162	72.71532
25	1.1	1	1.1	0.04	0.044	19.74984
27	1	1	1	0	0	0
29	1	1	1	-0.04	-0.04	-17.9544
		-	Total Di	scharge Rate:	5.0075	2247.66645

Additional Field Notes:

Depth = Depth of water at the segment midpoint

Length = Width of segment

Area = Area of segment (Depth x Length)

 $1 \text{ ft}^3 = 7.481 \text{ gallons}$ 

ft = feet

sec = second

	Project Solutia
4/3/01	Project Number 06626M32
1450	·
n-McBirney FloMate	
vn	
	1450 n-McBirney FloMate

Station (Stream Segment)	Depth (ft)	Length (ft)	Area (ft²)	Velocity (ft/sec)	Discharge Rate (ft³/sec)	Discharge Rate (gpm)
1	1.3	1	1.3	-0.05	-0.065	-29.1759
2	1.4	1	1.4	-0.15	-0.21	-94.2606
3	1.6	1	1.6	-0.06	-0.096	-43.09056
4	1.9	1	1.9	0.07	0.133	59.69838
5	2	1	2	0.32	0.64	287.2704
6	2	1	2	0.36	0.72	323.1792
_7	2.1	1	2.1	0.33	0.693	311.05998
8	2.1	1	2.1	0.46	0.966	433.59876
9	2.2	1	2.2	0.48	1.056	473.99616
10	2.1	1	2.1	0.34	0.714	320.48604
11	2	1	2	0.48	0.96	430.9056
12	2	1	2	0.44	0.88	394.9968
13	1.8	1	1.8	0.41	0.738	331.25868
14	1.7	1	1.7	0.36	0.612	274.70232
<del> </del>			Total Di	scharge Rate:	7.741	3474.62526

Additional Field Notes:

Depth = Depth of water at the segment midpoint

Length = Width of segment

Area = Area of segment (Depth x Length)

 $1 \text{ ft}^3 = 7.481 \text{ gallons}$ 

ft = feet

sec = second

Stream Gauge Location	SW-4	Project Solutia
Date	4/5/01	Project Number 06626M32
Time	1155	-
Gauging Methodology	Marsh-McBirney FloMate	
	Sunny; Dry 60 F	

Station (Stream Segment)	Depth (ft)	Length (ft)	Area (ft²)	Velocity (ft/sec)	Discharge Rate (ft³/sec)	Discharge Rate (gpm)
1	1.4	1	1.4	-0.04	-0.056	-25.13616
2	1.5	1	1.5	0.05	0.075	33.6645
3	1.6	1	1.6	0.11	0.176	78.99936
4	1.8	1	1.8	0.35	0.63	282.7818
5	1.9	1	1.9	0.36	0.684	307.02024
6	1.9	1	1.9	0.36	0.684	307.02024
7	2.1	11	2.1	0.36	0.756	339.33816
8	2.1	1	2.1	0.3	0.63	282.7818
9	2	1	2	0.4	0.8	359.088
10	2	1	2	0.3	0.6	269.316
11	1.9	1	1.9	0.34	0.646	289.96356
12	1.8	1	1.8	0.27	0.486	218.14596
13	1.7	1	1.7	0.35	0.595	267.0717
14	1.5	1	1.5	0.34	0.51	228.9186
			Total Dis	scharge Rate:	7.216	3238.97376

Additional Field Notes:

Depth = Depth of water at the segment midpoint Length = Width of segment Area = Area of segment (Depth x Length)

 $1 \text{ ft}^3 = 7.481 \text{ gallons}$ 

ft = feet

sec = second

SW-4	Project	Solutia
5/22/01	Project Number	06626M32
1405		
Marsh-McBirney FloMate		
Sunny; Dry 60 F		
_	5/22/01 1405 Marsh-McBirney FloMate	5/22/01 Project Number 1405  Marsh-McBirney FloMate

Station (Stream Segment)	Depth (ft)	Length (ft)	Area (ft²)	Velocity (ft/sec)	Discharge Rate (ft ³ /sec)	Discharge Rate (gpm)
1	0.8	1	0.8	0	0_	0
2	0.8	1	0.8	0.01	0.008	3.59088
3	0.9	1	0.9	0.14	0.126	56.55636
4	1	1	1	0.12	0.12	53.8632
5	1.1	1	1.1	0.15	0.165	74.0619
6	1.1	1	1.1	0.14	0.154	69.12444
7	1.2	1	1.2	0.16	0.192	86.18112
8	1.2	1	1.2	0.14	0.168	75.40848
9	1.1	1	1.1	0.16	0.176	78.99936
10	1	1	1	0.12	0.12	53.8632
11	0.9	1	0.9	0.02	0.018	8.07948
12	0.6	1	0.6	-0.07	-0.042	-18.85212
13	0.3	1	0.3	-0.05	-0.015	-6.7329
14	0.5	1	0.5	-0.03	-0.015	-6.7329
			Total Disch	arge Rate:	1.175	527,4105

## Additional Field Notes:

Depth = Depth of water at the segment midpoint

Length = Width of segment

Area = Area of segment (Depth x Length)

 $1 \text{ ft}^3 = 7.481 \text{ gallons}$ 

ft = feet

sec = second

Stream Gauge Location_	SW	7-5	Project Solutia			
Date_	9/15	5/00	Project Number 06626M32			-
	e <u>1215</u>					
Gauging Methodology Marsh-McBirney FloMate					_	
Field Conditions	Overcast, light	t rain		· · · · · · · · · · · · · · · · · · ·		•
Station (Stream Segment)	Depth (ft)	Length (ft)	Area (ft²)	Velocity (ft/sec)	Discharge Rate (ft³/sec)	Discharge Rate (gpm)
1	0.5	2.5	1.108	0.04	0.04432	19.8934752
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Additional Field Notes:

Total Discharge Rate:

0.04432

19.8934752

Stream Gauge Location	SW-5	Project Solutia	
Date	11/10/00	Project Number 06626M32	
Time	1045		
Gauging Methodology	Marsh-McBirney FloMate	<u></u>	
Field Conditions	Light rain, 50-55 F		

Station (Stream Segment)	Depth (ft)	Length (ft)	Area (ft²)	Velocity (ft/sec)	Discharge Rate (ft ³ /sec)	Discharge Rate (gpm)
1	1	2.5	2.22	2	4.44	1992.9384
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	<u></u>	·	Total Dis	scharge Rate:	4.44	1992.9384

Additional Field Notes:

Stream Gauge Location	SW-6	Project Solutia	
Date	11/10/00	Project Number 06626M32	
Time	1050		
Gauging Methodology	Marsh-McBirney FloMate		
	Light rain, 50-55 F		

Station (Stream Segment)	Depth (ft)	Length (ft)	Area (ft²)	Velocity (ft/sec)	Discharge Rate (ft ³ /sec)	Discharge Rate (gpm)
1	0.4	3.5	1.24	1.28	1.5872	712,430592
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		<u></u>	Total Dis	scharge Rate:	1.5872	712.430592

Additional Field Notes:

Stream Gauge Location Date Time Gauging Methodology Field Conditions	V-7 5/00 40 rney FloMate		Project Project Number	Solutia 06626M32		
Station (Stream Segment)	Depth (ft)	Length (ft)	Area (ſt²)	Velocity (ft/sec)	Discharge Rate (ft³/sec)	Discharge Rate (gpm)
1	1.85	1	1.85	0.023	0.04255	19.098993
3	1.85	2	3.7	0.073	0.2701	121.237086
5	1.85	2	3.7	0.057	0.2109	94.664574
7	1.85	2	3.7	0.09	0.333	149.47038
				-		

Additional Field Notes:

Total Discharge Rate:

0.85655

384.471033

Depth = Depth of water at the segment midpoint Length = Width of segment Area = Area of segment (Depth x Length)  $1 \text{ ft}^3 = 7.481 \text{ gallons}$ ft = feet

sec = second

Stream Gauge Location	SW-7	Project Solutia	
Date	11/10/00	Project Number 06626M32	
Time	1130		
Gauging Methodology	Marsh-McBirney FloMate		
Field Conditions	Light rain, 50-55 F		

Station (Stream Segment)	Depth (ft)	Length (ft)	Area (ft²)	Velocity (ft/sec)	Discharge Rate (ft ³ /sec)	Discharge Rate (gpm)
0	2.3	1	2.3	-0.02	-0.046	-20.64756
1	2.35	1	2.35	0.07	0.1645	73.83747
2	2.35	1	2.35	0.02	0.047	21.09642
3	2.35	1	2.35	0.08	0.188	84.38568
4	2.35	1	2.35	0.04	0.094	42.19284
5	2.3	1	2.3	0.07	0.161	72.26646
6	2.3	1	2.3	0.14	0.322	144.53292
7	2.3	1	2.3	0.9	2.07	929.1402
8	2.3	1	2.3	0	0	0
8,5	2.3	0.5	1.15	0.06	0.069	30.97134
				scharge Rate:	3.0695	1377.7757

Additional Field Notes:

Depth = Depth of water at the segment midpoint
Length = Width of segment
Area = Area of segment (Depth x Length)

1 ft³ = 7.481 gallons
ft = feet
sec = second

Stream Gauge Location_	SW-7	Project Solutia
Date	3/30/01	Project Number 06626M32
Time _	1355	•
Gauging Methodology	Marsh-McBirney FloMate	
Field Conditions 5		

Station (Stream Segment)	Depth (ft)	Length (ft)	Area (ft²)	Velocity (ft/sec)	Discharge Rate (ft³/sec)	Discharge Rate (gpm)
1	2.7	1	2.7	0.19	0.513	230.26518
2	2.7	1	2.7	0.5	1.35	605.961
3	2.7	1	2.7	0.58	1.566	702.91476
4	2.7	1	2.7	0.7	1.89	848.3454
5	2.7	1	2.7	0.91	2.457	1102.84902
6	2.7	1	2.7	0.91	2.457	1102.84902
7	2.7	1	2.7	0.75	2.025	908.9415
8	2.7	1	2.7	0.15	0.405	181.7883
		<u> </u>	Total Di	scharge Rate:	12.663	5683.91418

Additional Field Notes:

Depth = Depth of water at the segment midpoint Length = Width of segment Area = Area of segment (Depth x Length)

 $1 \text{ ft}^3 = 7.481 \text{ gallons}$ 

ft = feet

sec = second

Stream Gauge Location	SW-8	Project Solutia
Date	9/15/00	Project Number 06626M32
Time	1155	-
Gauging Methodology	Marsh-McBimey FloMate	
Field Conditions		

Station (Stream Segment)	Depth (ft)	Length (ft)	Area (ft²)	Velocity (ft/sec)	Discharge Rate (ft³/sec)	Discharge Rate (gpm)
1	0.4	2	0.8	0.023	0.0184	8.259024
2	0.4	2	0.8	0.08	0.064	28.72704
3	0.4	2	0.8	0.013	0.0104	4.668144
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			Total Di	scharge Rate:	0.0928	41.654208

Additional Field Notes:

Stream Gauge Location_	SW-8	Project Solutia
Date	11/10/00	Project Number 06626M32
Time	1330	
Gauging Methodology	Marsh-McBirney FloMate	
Field Conditions	Heavy rain, 50-55 F	

Station (Stream Segment)	Depth (ft)	Length (ft)	Area (ft²)	Velocity (ft/sec)	Discharge Rate (ft³/sec)	Discharge Rate (gpm)
0	0.5	1	0.5	-0.06	-0.03	-13.4658
1	0.4	1	0.4	-0.11	-0.044	-19.74984
2	0.4	1	0.4	0.1	0.04	17.9544
3	0.5	1	0.5	0.24	0.12	53.8632
4	0.5	1	0.5	0.19	0.095	42.6417
5	0.5	1	0.5	0.25	0.125	56.1075
6	0.5	1	0.5	-0.01	-0.005	-2.2443
7	0.6	1	0.6	-0.16	-0.096	-43.09056
7.5	0.6	0.5	0.3	-0.09	-0.027	-12.11922
			Total Di	<u>. I</u> scharge Rate:	0.178	79.89708

Additional Field Notes:

Depth = Depth of water at the segment midpoint Length = Width of segment

Area = Area of segment (Depth x Length)  $1 \text{ ft}^3 = 7.481 \text{ gallons}$ 

ft = feet

sec = second

Stream Gauge Location	SW-9	Project Solutia
Date	8/30/00	Project Number 06626M32
Time _	1750	
Gauging Methodology	Marsh-McBirney FloMate	
Field Conditions	Sunny; Dry 85 F	

Station (Stream Segment)	Depth (ft)	Length (ft)	Area (ft²)	Velocity (ft/sec)	Discharge Rate (ft ³ /sec)	Discharge Rate (gpm)
1	0.4	1	0.736	1.083	0.797088	357.7809197
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<del></del>		·····	Total Dis	charge Rate:	0.797088	357.7809197

Additional Field Notes:

Stream Gauge Location Date Time Gauging Methodology Field Conditions	9/19 15 Marsh-Mc		Project Solutia Project Number 06626M32  Mate				
Station (Stream Segment) 1	Depth (ft) 0.5	Length (ft) 5	Area (ft²) 1.021	Velocity (ft/sec)	Discharge Rate (ft ³ /sec) 1.66423	Discharge Rate (gpm) 747.00628	

Additional Field Notes:

Total Discharge Rate:

1.66423

747.00628

Depth = Depth of water at the segment midpoint Length = Width of segment Area = Area of segment (Depth x Length) 1 ft³ = 7.481 gallons ft = feet sec = second

Gauging Methodology	Marsh-McBirney FloMate Sunny; Dry 70 F				·	
Station (Stream Segment)	Depth (ft)	Length (ft)	Area (ft²)	Velocity (ft/sec)	Discharge Rate (ft ³ /sec)	Discharge Rate (gpm)
1	0.45	5	0.878	1.87	1.64186	736.9652796
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Additional Field Notes:

Total Discharge Rate:

1.64186

736.9652796

Depth = Depth of water at the segment midpoint Length = Width of segment Area = Area of segment (Depth x Length) 1  $\text{ft}^3$  = 7.481 gallons ft = feet sec = second

Stream Gauge Location	SW-9	Project Solutia
Date	4/3/01	Project Number 06626M32
Time	1435	
Gauging Methodology	Marsh-McBirney FloMate	
Field Conditions		

Station (Stream Segment)	Depth (ft)	Length (ft)	Area (ft²)	Velocity (ft/sec)	Discharge Rate (ft³/sec)	Discharge Rate (gpm)
1	1.1	1	1.1	2.5	2.75	1234.365
2	1.1	1	1.1	2.49	2.739	1229.42754
3	1.1	1	1.1	2.51	2.761	1239.30246
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			Total Dis	scharge Rate:	8.25	3703.095

Additional Field Notes:

Time Gauging Methodology	ate 4/5/01 Project Number 06626M32					
Station (Stream Segment)	Depth (ft) 1.5	Length (ft) 5	Area (ft²) 12.28	Velocity (ft/sec) 2.63	Discharge Rate (ft³/sec) 32.2964	Discharge Rate (gpm) 14496.562
			Total Disci	narge Rate:	32.2964	14496.562

Additional Field Notes:

	1425 Marsh-McBirney FloMate		P			
Station (Stream Segment)	Depth (ft)	Length (ft)	Area (ft²)	Velocity (ft/sec)	Discharge Rate (ft³/sec)	Discharge Rate (gpm)
1	0.7	5	1.6704	1.01	1.687104	757.2735014
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**Additional Field Notes:** 

Total Discharge Rate:

Depth = Depth of water at the segment midpoint Length = Width of segment Area = Area of segment (Depth x Length)  $1 \text{ ft}^3 = 7.481 \text{ gallons}$ ft = feet sec = secondgpm = gallons per minute

757.2735014

1.687104